THE MANKIND QUARTERLY

VOLUME XL No. 4 Summer 2000

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BRUNETTO CHIARELLI
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CONTENTS

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In Memoriam
Professor Edgar C Polomé, died March 11 2000, aged 79

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Cover Picture: Funerary stele from Lemnos bearing the image of a Greek warrior and an inscription in an archaic Greek alphabet similar to that adopted by the Etruscans. (See article: *Etruscan and Lemnian appear to be Twigs of the Pelasgian Branch of the Indo-European Language Tree*).

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Genetic Diversity and Population Structure Among 13 Endogamous Populations of Purnia, Bihar

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The relation between populations structure variables and regional diversity was investigated among the thirteen endogamous populations of Purnia division, Bihar, who belonged to different castes and ethnic groups with various migratory origins The phenotypic and gene frequencies of four common loci (ABO, Rh, PTC and Color Blindness).show wide differences between populations. In general B is more common than A, but in four populations, where group O is predominant. Rh negative frequency is the highest among Brahmin and non-taster gene frequency is the least among Chamars. Among the castes, Brahmins show a maximum value of the average heterozygosity per locus (37.6%). The extent of genetic differentiation between populations (as measured by *Gst*) is 1.45%. The genetic distance analysis and the cluster analysis based on Nei's and Harpending and Jenkins' measure, show agreement between the observed levels of genetic diversity in line with the ethno-historical migration. This is also in agreement with the caste hierarchical structure of the regional populations. Principal component analysis based on similarity index ahows the same pattern. The apportionment of genetic diversity analysis supports the hypothesis of differential migratory origins for these populations. The Harpending and Ward model used to investigate the association between population structure and genetic diversity fits the data in predicting the heterozygosity levels in relation to the long range gene flow, especially from the eastern migrants.

Introduction

Understanding the extent and pattern of genetic variation and explaining the plausible causative factors among human populations are the major objectives of anthropological genetics. Previous studies have approached the problem by model-free methods, which attempt to infer possible influence of population structure variables by distance measures and dendrograms by comparing the variation between populations. Recently model-bound methods have been developed for using polygenic quantitative traits to test the hypothesis of population structure variables (especially for gene

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flow) on the between-population variation and genetic distance measures (Chakroborty, 1990). The application of model-based studies in some populations have revealed the extent of the influence of migration and other factors on the genetic differentiation between populations, as for example, among the Jirels of Nepal (Williams-Blangero, 1990). In this study the model-bound approach has been considered among regional populations of known historical migration background to detect the influence of migration on the genetic differentiation.

Studies among Indian populations are mostly based on model-free methods. And the results of these studies have shown wide genetic diversity characterized by gradients of gene frequencies with uneven distribution of very high or low frequency of a few characters in certain populations (Malhotra and Vasulu, 1993: Majumder and Mukherjee, 1993 and etc.). Attempts to explain the causative factors of this uneven pattern of distribution have shown that geographical contiguity and ethno-historical factors are the primary explanatory variables, although other associated population structure variables also play an important role. However, the relative importance of these explanatory variables differ between populations, so that to discern a general trend, studies covering many populaitons over a region and small scale local studies, especially specific populations, are necessary.

In this context, regional level studies aiming to discern the genetic diversity at the level of local populations (e.g. tribal, ethnic or isolated) is expected to provide a better explanation of the causative factors involved. Indeed such regional studies in some specific populations have revealed the role of population structure in explaining the pattern of genetic variation. For example, the pattern of affinity between the two neighboring populations of Himachal Pradesh, especially, Kamte and Kotis, are due to admixture with the neighboring Tibetans (Papiha, 1985). Despite Dhangars, a caste cluster of 23 endogamous groups widely distributed throughout the Maharashtra state, the extent of genetic differentiation (based on 21 loci) between castes is only about 7% (Malhotra et al., 1978). Similarly, geographic proximity explain the patterns of genetic variation between the local groups of Konda Doras of Andhra Pradesh (Walter et al., 1981). In a study among the Yanadi (a transitional tribe who represent different stages of subsistence in

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different regions) microevolutionary changes have been observed in size and shape aspects of body morphology and dermatoglyphics characters. The study showed greater variability among females than males, which was explained due to population structure variables: especially, marriage pattern, admixture etc. (Vasulu 1989, 1991, 1993, 1999; Vasulu and Pal 1989). In this context, it is important to use model-bound methods which may be expected to show a better resolution of the microevolutionary process and the influence of population structure of Indian populations. Such studies have not been fully explored either at the regional level or in relation to the populations of different regions. Here we report on such a study in a part of the Bihar close to the borders of Nepal and Bangladesh. Bihar has rich historical records of migration in the past which continues even today. This provides an opportunity to study genetic diversity and the microevolutionary process, but due to several constraints, only a few studies (based on model-free methods) have been conducted and there is a dearth of such studies of the endogamous populations of this region.

North Bihar has been populated since ancient times (500 BC) and was the center of two great historical dynasties of Maurya and Gupta rulers in ancient India. During the recent times there has been several waves of migration from neighboring states (Saha et al., 1993). The present population has a diverse mixture of old stocks of endogamous populations belonging to a common origin and recent populations of heterogeneous mixture from different regions. From the genetic point of view, it represents a mosaic of gradients of homozygosity and heterozygosity in the same region which are primarily due to ethno-historical reasons rather than geographical proximity. This paper reports the genetic diversity (based on four common loci) and the influence of some aspects of population structure among thirteen populations living in Purnia division of Bihar, India.

Materials and Methods

Blood samples from 3270 individuals (selected randomly) were collected from 13 endogamous populations living in different villages and in Purnia town, Bihar. They are Bania, Bengali, Bhumihar, Chamar, Dusadah, Kayastha, Kurmi, Mushar, Muslim, Rajput, Yadav, and Malah. Due to constraints of availability of sera,

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chemicals and lab facilities in this region, only the frequency of four Mendelian traits has been considered for analysis. These are ABO blood groups, Rh system (two loci), PTC taste sensibility, and red-green color blindness. The phenotypic and gene (allele) frequencies of the traits were estimated according to the methods proposed by Mourant et al., (1976), Harris and Kalmus (1950), Ishihara (1964).

The sample size varies from 170 in Malah to a maximum of 368 in Chamar population. The 13 populations belong to four different caste groups: 1. Forward caste: Brahmin, Bumihar, Kayastha and Rajput; 2. Backward castes: Bania, Kurmi and Yadav; 3. Scheduled castes: Chamar, Dusadah, Malahand and Mushar and 4. Heterogeneous populations: Muslim and Bengali. Records indicate that these populations settled in the 12th century, migrating from neighboring regions and also from other parts of Bihar. Since the 1934 earthquake when the land became fertile and agriculture flourished, other populations migrated. Castes like Rajput, Bhumihar, Brahmin, Kayastha migrated from different areas including eastern Uttar Pradesh. Muslims from Bangladesh are still arriving. The Bengali population is represented by different caste groups, especially Brahmin (Mukherjee, Benerjee, Chatterjee, Banadopadhya, and Ganguli) and other caste groups (Ghosh, Sen, Serkar, Choudhury, Adhikari etc.)

The extent of heterogeneity in gene frequency was estimated by a contingency chi-square test, defined as

$$X^2 = 2N\sum_{j=1}^{k}\frac{\sigma_{pj}^2}{\bar{p}_j}$$

Where, p_j is the frequency of *jth* allele at *k* locus, and $N = \Sigma_{i=1}^{r} n_i$ where, n_i is the sample size of the *ith* population, and *r* is number of populations. $\bar{p}_j$ and σ_{pj}^2 are the weighted mean and variances of the *j*th allele respectively. The average heterozygosity index H of Nei (1973), a measure of the extent of genetic variation within a population, and is estimated by the formula $H = 1 - \Sigma_{i=1}^{k} p_i^2$. Where p_i^2 is the frequency of *i*th allele at a locus. And the gene diversity in the total population is given by:

$$H_T = 1 - \sum_{k=1}^{r}\overline{(p_k^2)}$$

Where

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$$\overline{p_k^2} = \sigma_{i=1}^{k} \cdot w_i \cdot p_{ik}^2$$

is the weighted average of squared allele frequency and P_{ik} is the frequency of allele k in the ith subpopulation relative to the size of the total population (i.e. $\sigma_i \cdot w_{ii} = 1$). Further, G_{ST}, coefficient of gene differentiation, which is equivalent to Wright's (1965), F_{ST} and G_{ST} (= F_{ST}) = $\sigma_i w_i r_{ii}$. Where w_i is the proportion of the total population living in subdivision i, and r_{ii} are the diagonal elements of the R-matrix. And $G_{ST} = D_{ST}/H_{ST}$, D_{ST} is the average gene diversity between subpopulations and $H_T = H_S + D_{ST}$, where, H_S within subpopulations and H_T is the average gene diversity in the total population.

Both Nei's maximum genetic distance and Harpending and Jenkins R-matrix or distance r_{ij} (Harpending and Jenkins, 1973 and Harpending and Ward 1982) were estimated.

$$r_{ij} = \frac{(p_i - \bar{P})(p_j - \bar{P})}{\bar{P}(1 - \bar{P})}$$

where, p_i and p_j are the allele frequencies, and $\bar{p}$ is the mean allele frequency over all the populations. The R-matrix is obtained by taking the average over all alleles. Dendrograms based on single linkage clustering method is used to represent relative affinities between the studied populations. Further, confirmatory analysis for the interrelationship between populations was also obtained by principle component analysis from the similarity matrices based on both Nei's and Harpending and Jenkins distance measures. The similarity matrix S_{ij} is obtained by the following transformations S_{ij} = 1- d_{ij}/D, where d_{ij} is the distance between two populations i and j and D is the maximum distance value of the corresponding distance matrix.

The hypothesis of ethno-historical migration was investigated by Rao's hierarchical analysis of apportionment of diversity (Rao, 1982). It basically involves estimating the contributions within and between diversity to the total diversity at different levels of hierarchical structures of the populations, which is defined on the basis of ethno-historical and other information about the population structure. To investigate the spatial and temporal variation in genetic isolation the diagonal elements (r_{ii}) of the Harpending and Jenkins R-matrix was compared. The r_{ii} values are the genetic distances of each population from the average allele frequency (centeroid) and are a

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measure of the genetic isolation. Under equilibrium between gene flow and genetic drift, according to Harpending and Ward (1982), heterozygosity and distance from the centeroid are expected to be linearly related according to the following equation.

$$E[\overline{H}_i] = \overline{H}_T(1 - r_{ii})$$

where $E[\overline{H}_i]$ denotes the expected value of heterozygosity in population, assuming constant effective size and migration. It also assumes symmetric number of migrants between any pair of populations. A population with greater heterozygosity according to Harpending and Ward (1982) model is suggestive of greater proportion of long-range gene flow.

Results

Phenotypic frequency

Table 1 shows the frequency of four common genetic loci: ABO, Rh, PTC and Color Blindness. In general, B and O blood groups are more frequent than A and they show differences among castes. The five populations: especially, two backward castes (Kurmi and Bania), two Scheduled castes (Chamar and Dusadah) and one forward caste (Bhumihar) show greater frequency of blood group B than A and O blood groups. Whereas O is predominate over both A and B in another five populations: Bengali and Muslim, Kayastha and Rajput (forward caste) and Yadav (backward caste). And only two populations, Brahmin and Malah show higher frequency of A than B and O. Only one population (Mushar) shows equal frequencies of both A and O blood groups. Blood group AB is comparatively less frequent in this region, as was the case in other regions in the Indian subcontinent. In general, in the Gangetic plain, B blood group is more predominant than A (Roychodhury, 1983): for example, among Bania, Rajput and Yadav of Utter Pradesh (Mondal, 1992) and among Chamars of Punjab (Sishu, 1994), Tats of Harayana (Yadav and Gupta, 1992); among Brahmin, Bania, Kayastha, Sudra and Muslim of Madhya Pradesh (Koley and Srivastava, 1992) and populations from Kashmir (Bhasin and Khanna, 1992). In Bihar higher incidence of group B and O among Dusadah and Muslim of Bhagalpur region (Gupta, 1992) and among Oraons of Ranchi and Purnia divisions (Sharma (1976), Pandey et al., 1993, 1995).

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Table 1. Frequency of ABO, Rh blood groups, PTC taste sensitivity and Color blindness in 13 endogamous populations of Purnia Division, Bihar.

	ABO blood group					Rh Negative	PTC Non-tasters	Red-Green Color blindness
	N	A	B	AB	O			
Bania	190	18.9	36.8	14.7	29.5	1.6	30.5	2.6
Bengali	210	21.4	32.4	7.1	39.0	3.3	28.6	3.8
Bhumihar	209	20.0	37.3	8.6	34.0	1.9	23.4	0.9
Brahmin	208	34.6	26.0	7.2	32.2	7.2	28.8	1.9
Chamar	368	21.7	40.8	4.1	33.4	0.3	18.7	2.2
Dusadh	222	25.7	35.6	9.9	28.8	1.3	30.6	4.5
Kayastha	228	22.8	25.4	12.3	39.5	5.3	25.0	0.8
Kurmi	298	13.4	45.6	7.0	33.9	1.3	24.8	0.3
Mushar	325	31.7	24.9	10.7	32.6	2.5	25.2	2.8
Muslim	304	16.4	27.0	9.8	46.7	4.9	32.2	3.6
Rajput	282	21.3	34.7	6.7	37.2	4.3	21.9	1.8
Yadav	247	20.2	32.0	8.9	38.9	3.2	27.9	3.2
Malah	179	35.2	25.1	10.6	29.1	3.9	30.7	7.3
TOTAL	3270	22.9	32.9	8.8	35.3	3.0	26.3	2.6

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The allele frequency estimates of the above four loci were shown in Table 2. The O allele frequency is higher among Muslim (0.67), Bengali, Rajput and Yadav (61% and above) and it is lower among Bania, Malah and Dusadh (0.52 to 0.54). In Purnia region, the three populations *viz.*, Brahmin, Mushar and Malah show higher frequency of group A allele (0.23 to 0.26) and it is least observed among Kurmi (0.108). In case of Rh system, Rh negative is highest among Brahmin (7%) and it is about 4% among Kayastha, Muslim and in Rajput. It is lowest among Chamar (0.3%) and less frequent among Kurmi and Dusadah (1.34%) and it is less than 2% among Bania and Brahmin. The frequency of non-tasters was higher among Bania, Bengali, Brahmin. It was least among Chamars (18.7%), Rajput (22%), Bhumihar (23%). Red-green color blindness is prevalent among Malah (7.3%), Dusadah (4.5%), Bengali (3.8%), Muslim (3.6%). It is least among Kurmi (0.3), Bhumihar (0.9), Rajput (1.87), Brahmin (1.9%).

Genetic heterogeneity

The extent of (within) genetic heterogeneity in allele frequency among the 13 local populations of Purnia was examined by X^2 test of significance. The results show significant differences in all the four loci studied and the differences are more or less equal with respect to each of the loci. However the pooled values over all loci together show a greater significant difference ($p < 0.01$) among the thirteen populations of Purnia division, Bihar. A comparison of variances in allele frequency also suggests wide differences. Chamar and Kurmi show least values for both A and O allele, Mushar for B allele. Of the thirteen populations four show the least allelic variance; Chamar (A, O, PTC and Rh) Kurmi (A, Rh, Cb), Mushar (B, PTC), Muslim (B, O). The other populations show greater variances for different loci: Malah (A, O, Rh, PC, Cb), Bania (B, O, PTC), Dusadh (B, Cb) whereas Kayastha show the highest variance for Rh allele frequency.

The inter-group differences in the allelic frequency were examined by (2 statistics (table not presented). The results show that Dusdah is homogeneous with 9 other populations and Kurmi, a tribal population shows significant heterogeneity with 11 other populations. Bania, Brahmin and Malah and Chamar are significantly different from 9 other populations respectively. The observed

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Table 2. Estimates of gene frequency of ABO, Rh blood groups, PTC and Color blindness loci among 13 endogamous populations of Purnia Division, Bihar.

		ABO blood group			Rh		PTC		Red-green color blindness	
	N	p	q	r	D	d	T	t	C	c
Bania	190	0.182	0.299	0.518	0.874	0.126	0.447	0.552	0.026	0.973
Bengali	210	0.154	0.222	0.623	0.817	0.183	0.465	0.534	0.138	0.962
Bhumihar	209	0.155	0.264	0.580	0.862	0.138	0.516	0.484	0.009	0.990
Brahmin	208	0.238	0.183	0.577	0.731	0.269	0.462	0.537	0.019	0.981
Chamar	368	0.140	0.260	0.598	0.948	0.052	0.567	0.433	0.022	0.978
Dusadh	222	0.197	0.262	0.539	0.884	0.116	0.446	0.553	0.045	0.955
Kayastha	228	0.191	0.207	0.601	0.771	0.229	0.500	0.500	0.009	0.991
Kurmi	298	0.108	0.311	0.580	0.884	0.116	0.512	0.498	0.003	0.997
Mushar	325	0.240	0.197	0.562	0.843	0.157	0.498	0.502	0.028	0.972
Muslim	304	0.139	0.202	0.668	0.778	0.222	0.432	0.568	0.036	0.964
Rajput	282	0.151	0.235	0.613	0.794	0.206	0.531	0.469	0.018	0.982
Yadav	247	0.157	0.229	0.613	0.820	0.180	0.471	0.528	0.032	0.968
Malah	179	0.263	0.198	0.537	0.802	0.198	0.446	0.554	0.073	0.927
TOTAL	3270	0.173	0.236	0.591	0.826	0.174	0.487	0.513	0.026	0.974

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phenotypic frequencies of ABO system is in Hardy-Weinberg equilibrium in all the 13 populations, except for Chamar (X^2 = 8.893, d.f. $p < 0.01$), Muslim (X^2 = 13.96, d.f. 1 $p < 0.01$) and in Kayastha (X^2 = 8.86, d.f. 1, $p < 0.01$) populations. The deviation from the expected Hardy Weinberg frequencies observed in case of Chamar, Muslim can be accounted for the inbreeding practiced, whereas in case of Kayastha it is possibly because of heterogeneous group of migrants from different stocks from neighboring state of West Bengal. The observed frequencies of color blindness are according to Hardy-Weinberg equilibrium in all the populations.

Genetic Diversity analysis

The average heterozygosity (per locus) values are shown in Table 3. The values range from a least 0.296 in Chamar and Kurmi (0.316) to a maximum (0.376) in Brahmin and Malah (0.387) populations. Of the four loci, ABO locus show maximum heterozygosity levels ranging from 0.494 in Muslim to 0.609 in Bania, 0.603 in Malah and 0.602 in Dusadh. The least heterozygosity values are found for color blindness followed by Rh locus, whereas PTC shows near 0.50 values. The absolute magnitude of gene differentiation among the local populations of the region (Dst) is only 0.48% and the values of Gst, a measure of extent of genetic differentiation among the subpopulations, is also very low (1.45%). Both Gst and Dst are not significantly different among the regional populations, since the values are less than three standard deviations.

Genetic Distance and Cluster Analysis

To investigate the genetic relationship between the local populations, Harpending and Jenkins' distance and Nei's (maximum genetic) distance measures were computed (Table 4). The values between the two distance measures were almost of the same order, but the difference between the two types of distance measures is that Nei's distance shows a lesser variability (0.18) than Harpending and Jenkins (0.203). The variance by mean ratio is also of the same order (4.31 for Nei's and 5.69 for Harpending and Jenkins). The (rank) correlation between the distances is also very high ($r = 0.92$, $p < 0.01$). The genetic distance values range from a minimum of zero between Brahmin and Chamar, which is not expected in view of strict avoidance of intermarriages between them, and to a maximum

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Table 3. Average heterozygosity per locus and gene diversity measures among 13 endogamous populations of Bihar.

	Locus				Average heterozygosity per locus
	ABO	Rh	PTC	CB	
Bania	0.609	0.266	0.494	0.051	0.355
Bengali	0.538	0.299	0.497	0.352	0.352
Bhumihar	0.569	0.238	0.499	0.332	0.332
Brahmin	0.577	0.393	0.497	0.376	0.376
Chamar	0.555	0.098	0.491	0.297	0.296
Dusadh	0.602	0.205	0.494	0.347	0.347
Kayastha	0.559	0.353	0.500	0.356	0.357
Kurmi	0.555	0.205	0.499	0.317	0.316
Mushar	0.587	0.265	0.499	0.352	0.356
Muslim	0.493	0.345	0.491	0.349	0.349
Rajput	0.546	0.327	0.498	0.351	0.351
Yadav	0.547	0.295	0.498	0.351	0.351
Malah	0.603	0.317	0.494	0.387	0.387
Gene diversity measures:					
H_o	0.565	0.278	0.497	0.053	0.348
H_t	0.570	0.331	0.501	0.054	0.364
H_s	0.565	0.320	0.498	0.053	0.359
D_{st}	0.005	0.0105	0.0031	0.0006	0.0048 + 0.004
G_{st}	0.0088	0.0318	0.0061	0.0115	0.0145 + 0.011

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Table 4: Estimates of Nei's maximum genetic distance (above diagonal) and Harpending and Jenkins distance (below diagonal) among populations of Purnia Division, Bihar.

	1	2	3	4	5	6	7	8	9	10	11	12	13
Bania	.88	48	30	118	85	6	82	27	43	96	78	41	57
Bengali	142	.024	26	50	99	37	20	45	30	14	21	1	43
Bhumihar	89	129	.053	98	35	31	40	10	26	74	21	19	74
Brahmin	401	197	353	.179	234	112	18	151	53	45	55	50	38
Chamar	239	354	138	844	.271	76	135	38	79	181	86	90	168
Dusadh	39	120	162	432	252	.106	79	38	30	85	77	34	41
Kayastha	269	118	146	63	547	335	.075	78	27	33	11	18	48
Kurmi	121	233	39	566	140	236	289	.151	63	97	47	38	117
Mushar	122	92	109	192	292	106	124	265	.048	71	37	25	24
Muslim	296	42	264	172	603	276	134	384	217	.103	47	19	64
Rajput	217	75	109	166	347	269	37	185	124	128	.041	17	76
Yadav	117	4	66	187	318	116	94	189	79	57	55	.009	42
Malah	343	216	513	307	759	279	408	740	208	291	413	244	.265

* The diagonal elements are (figures in decimals) Harpending and Jenkins R-Matrix (Rii) values.

** The distance values of Nei's measure (above diagonal) have been multiplied by 10000 and Harpending and Jenkins (below diagonal) have been multiplied by 1000.

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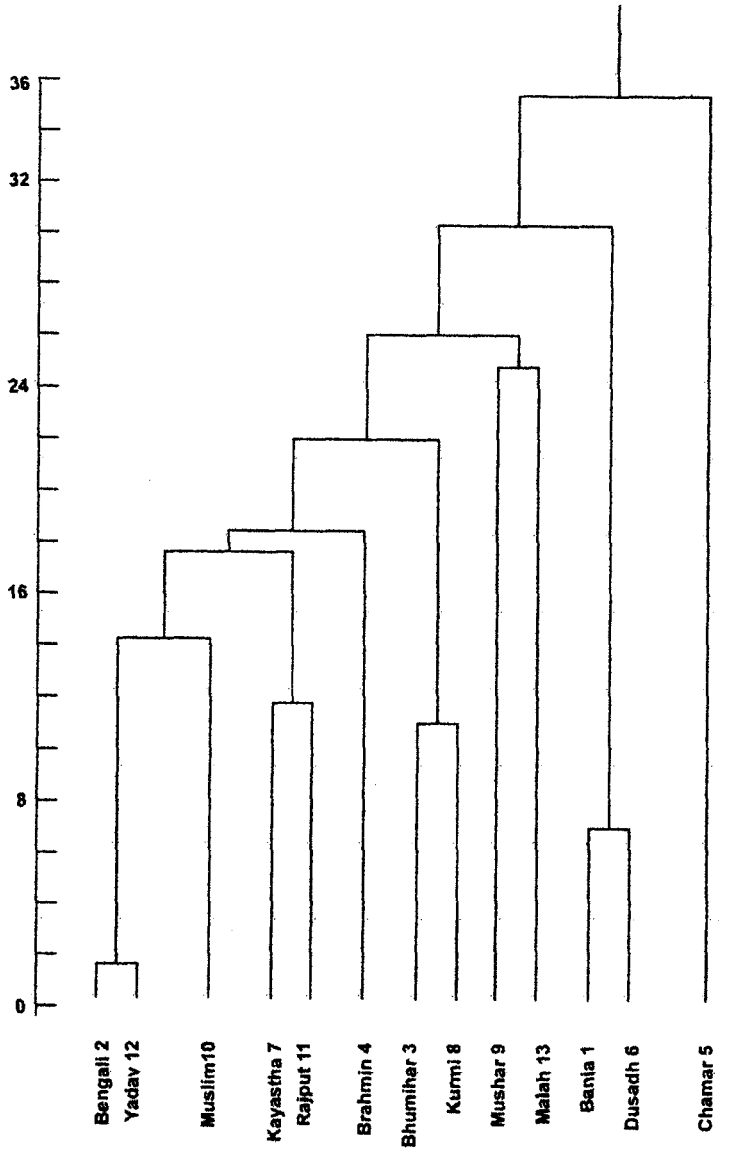

Figure 1. Dendrogram showing the relationship between 13 endogamous populations of purnia. (Based on Nie's maximum genetic distance measure)

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distance between Chamar and Malah, and Bengali and Yadav. In general, the distance values indicate wide diversity among the local populations. Dendrograms based on the distance matrices were drawn to show the pattern of genetic affinity between thirteen subpopulations (Fig. 1). Bengali and Yadav, Bhumihar and Kurmi, Bania and Dusadah, Kayastha and Rajput form homogeneous clusters. Chamars is distinctively different from others and forms a separate group. Mushar and Malah form a cluster but not at close range. Castes are endogamous groups which restrict inter-caste marriages, this is especially true between the Brahmin and Chamar, the castes at the highest and lowest hierarchical positions. Based on the socioeconomic criteria, the castes can be considered as (a) the forward castes; Brahmin, Bhumihar, Kayastha and Rajput, whereas Bania, Kurmi and Yadav are the (b) backward castes and the lowest in the caste hierarchy are the (c) scheduled castes: Chamar, usadah, Malah and Mushar. The Muslim and Bengali are heterogeneous populations, which represent several castes and sects and came from the neighboring regions. Except for the three backward castes of Bania, Yadav and Kurmi, the rest 10 populations in the dendrogram follow the caste hierarchy, a good agreement between the social and biological expectations, even though it is based on only four common loci. The dendrograms based on Harpending and Jenkins distance matrix is almost identical to the one based on Nei's, except for Malah, which separates out from the rest of the populations along with Chamars.

The distance matrices were converted to similarity indices and these were used for principle component analysis to identify common factors. The analysis has resulted into two components, which were used to represent the relative scatter of the local populations (Fig. 2). The two similarity matrices give almost identical pattern and almost equal factor loading, and the figures (scatter) obtained by the two distance matrices are also the same. The graphical representation of the two factors shows relative genetic affinity of the local populations, which is similar to that obtained by the dendrograms. The two factors represent about 90% of the variation. Eight populations represent the first factor: Brahmin, Malah, Muslim, Bengali, Yadav, Rajput, Mushar and Kayastha. The second factor represents five populations: Chamar, Kurmi, Bania,

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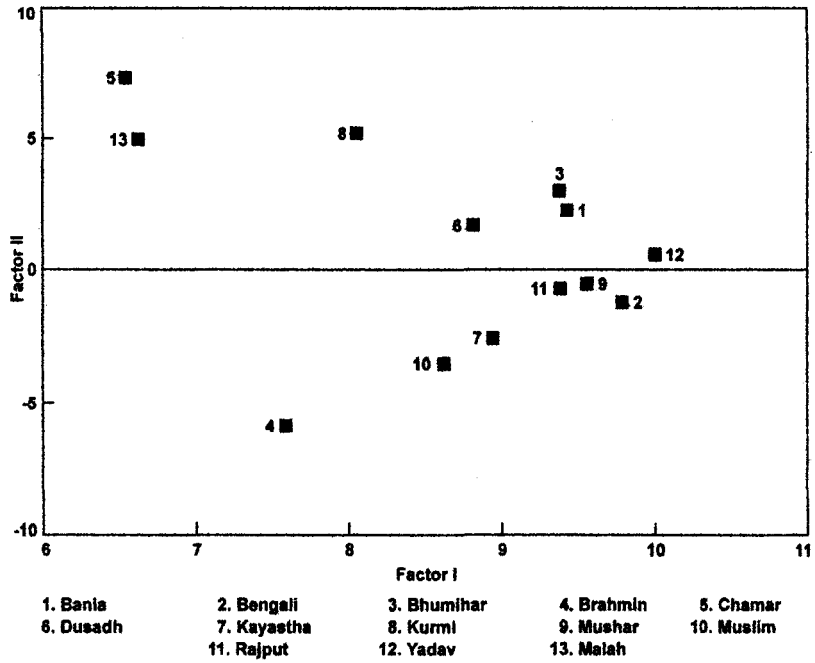

Figure 2. Distribution of 13 endogamous populations of Purnia by principle component analysis.

Dusadah and Bhumihar. However, the populations Bengali, Yadav, Rajput, Mushar (represented primarily by the first factor) and Bania, Bhumihar and Dusadah (represented by the second factor) show factor loading common to second and first factors (range 0.35 to 0.43) respectively. A similar results of ethno-linguistic clustering and genetic diversity (based on four polymorphic loci) were also observed Saha et al., (1992). A comparison of the dendrograms and factor analysis indicates close agreement between the two methods of analysis. The populations represented by factor I and factor II occupy the extreme positions in the dendrogram(s) and those populations that are placed in the middle of the dendrogram are those which also show common factor loading between factor I and factor II. But the populations with higher loading are also clearly separated in the dendrogram(s) as well.

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Population structure and genetic model

The hypothesis of ethno-history can be tested by hierarchical analysis of genetic diversity. The available historical information suggests that these regions were settled during 11th to 12th centuries. Several caste populations in and around, especially, Rajput, Bhumihar, Brahmin, Kayastha, have migrated from different areas of Bihar as well as from the eastern parts of Utter Pradesh. Muslim and Bengali populations came from other regions on the eastern side at different times and the migration still continue. This suggests that there are different levels of migration: These have been identified as settlers (Hs) and sub-settlers (Hts and Hss). The two main categories of settler (Hs) are (a) The eastern migrants (Muslim and Bengali) and (b): The western migrants. Further, the western migrants are subdivided into two types: (b1) migrants from neighboring state of Utter Pradesh and (b2) within Bihar (Bania, Brahmin, Rajput and Yadav). In within Bihar there are further two types of migrants: (b21) - early settlers (Bhumihar, Dusadah, Mushar, Malah) and (b22) late settlers. A schematic model of migration structure of the population is shown in Fig. 3. The different levels of migration structure and its contribution to the total genetic diversity of the region can be considered by hierarchical gene diversity analysis. The "within gene diversity" for a particular hierarchical level for the study population is given in Table 5. The apportionment of diversity at various levels for each locus and overall contribution is given in Table 6. The results indicate that (1.) the diversity between the 13 populations compared to the total (based on the four loci) ranges from 0.9 to 2.3 (average 1.1%); (2.) diversity between sub-settlers (Hss) compared to the total population range from 17 to 85% with an average 58.76%; (3.) diversity between settlers (Hts) and sub-settlers (Hss) ranges between 5.56% (color blindness) to 56% (ABO) and with an average58.77% and (4.) diversity between (Hs) and (Hts) range from 41% to 96%, except for color blindness (0%) with an average 66.42%. This suggests maximum diversity between Hs (settlers) and Hss (sub-settlers). The diversity between the Hts and Hs is almost the same, implying that there is least genetic differences between populations who have migrated from Uttar Pradesh and within Bihar and they both show striking differences from the eastern migrant populations of Muslim and Bengali. However, a more direct

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Table 5. Within-gene diversity per locus at different hierarchical levels of Migration among the Purnia regional populations, Bihar.

		Within diversity (H) at locus				
		ABO	Rh	PTC	CB	Total
All Populations (Ho)	O:	0.5707	0.2803	0.4994	0.0536	0.3511
Settlers (Hs)	-:	0.5685	0.2793	0.4993	0.0536	0.3511
	M:	0.5349	0.3333	0.4976	0.0538	
	C:	0.5786	0.2631	0.4997	0.0536	
Type of Settlers (Hts)	-:	0.5684	0.2776	0.4991	0.0536	0.3497
	M:	0.5349	0.3333	0.4977	0.0538	
	HC:	0.5728	0.3142	0.4991	0.0466	
	LC:	0.5822	0.2255	0.4999	0.0582	
	-:	0.5665	0.2766	0.4985	0.0534	0.3487
	OM:	0.5055	0.3454	0.4908	0.0697	
	RC:	0.5484	0.3271	0.5040	0.0458	
Sub types (Hst)	HC1:	0.5964	0.3169	0.4959	0.0444	
	HC2:	0.5446	0.3115	0.4999	0.0488	
	LC1:	0.5544	0.1538	0.4976	0.0246	
	LC2	0.5922	0.2581	0.4988	0.0744	
	P:	0.5657	0.2739	0.4964	0.0525	0.3472

The capital letters stand for abbreviation for different type of settlers that were described in Figure 3.

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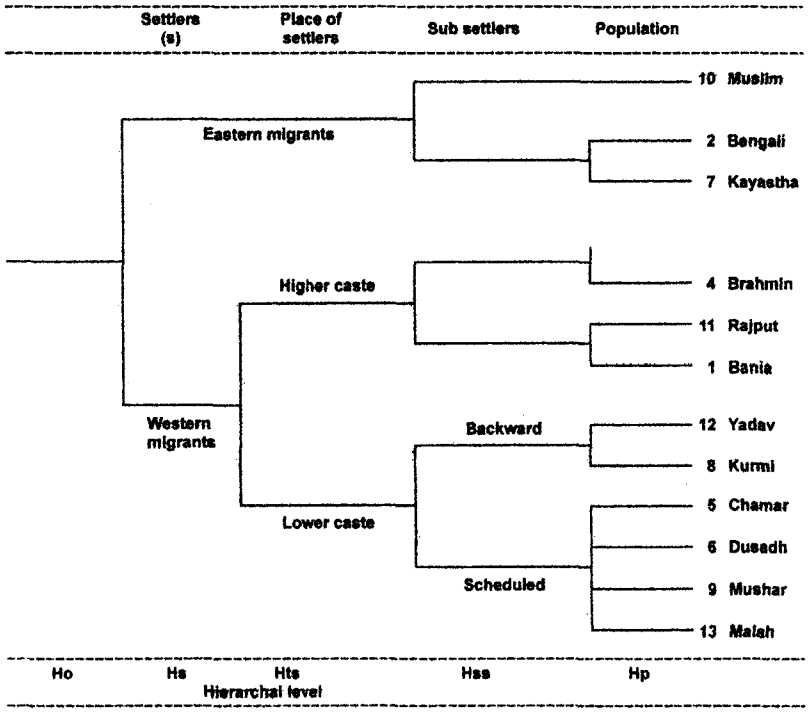

Figure 3. Schematic diagram showing hierarchal levels of different type of settlers among 13 populations of Purnia, based on the ethno-historical records.

investigation of the genetic diversity due to migration will be to study both the migrants and its parental population from where they have migrated, but such information for the Bihar populations is not readily available due to differential migration patterns that have occurred over centuries. Indeed such studies can also reveal microevolutionary changes due to genetic drift, founder effect etc. For example, Reddy et al., (1995) has observed significant genetic differences among parental and migrant fishermen of the east coast which they contribute to founder effect and genetic drift.

The weighted average elements of the R-matrix provide an estimate of Wright's Fst, a measure of population differentiation. The diagonal elements of R-matrix are the genetic distances of each population to the centeroid, defined in terms of the average allele

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Table 6. Apportionment of diversity analysis at different hierarchical levels of within and between populations among 13 endogamous populations of Purnia division, Bihar.*

Due to	ABO	%	Rh	%	PTC	%	CB	%	Overall	%
Ho - Hs : between Hs	0.0022		0.0011		0.0002	0	0.00089			
Hs - Hts : between Hts and within Hs	0.0001	95.7	0.0016	40.8	0.0006	63.3	0.00001	0	0.00045	66.4
Ho - Hts : between Hts	0.0023		0.0026		0.0003		0.00001		0.00134	
Hts - Hss : between Hss and within Hts	0.0018	55.6	0.0010	71.9	0.0006	31.2	0.00017	5.5	0.00094	58.8
Ho – Hss : between Hss	0.0042		0.0037		0.0009		0.00018		0.00228	
Hss – Hp : between Hp and within Hss	0.0007	84.5	0.0027	58.3	0.0020	32.0	0.00009	16.6	0.00160	58.8
Ho - Hp : between Hp	0.0050		0.0064		0.0030		0.00108		0.00388	
Hp within Hp	0.5657	0.8	0.2739	2.3	0.4964	0.6	0.05256	2.0	0.34718	1.1
Ho Total	0.5707		0.2804		0.4994		0.05364		0.35106	

* The capital letters stand for abbreviations for different types of settlers that were described in Figure 3.

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frequencies over all populations. Under equilibrium between gene flow and genetic drift, heterozygosity and distance from the centeroid are expected to be linearly related, provided the effective size of the population is constant and migration rate between populations is roughly the same. Under the assumptions, the deviations from the model are supposed to indicate large gene flow. A greater heterozygosity is expected when a population has received greater than average long range gene flow and similarly if a population has received less than average long-range gene flow will show least heterozygosity of the 13 populations drawn on X-axis and Y-axis respectively. Except for the population of Brahmin and Malah, the rest show a linear relationship. Including all the thirteen populations, the correlation between expected and observed heterozygosity is very low (r =0.089). But when the two outliers are removed the correlation is high (r = 0.83 + 0.086) and the regression equation is Y = -0.065 X + 1.179.

Discussion

In Bihar situation, as in most other regions, the strict endogamy of caste, factors of ethno-historical migration and population structure of the individual populations are the main factors that determine the biological status of the regional populations of Purnia division. In other studies which investigating the biological validity of caste hierarchy, the results have indicated perceivable differences in genetical and morphological characters between tribal and nontribal populations. But such differences were least observed among geographically contiguous populations, among two different castes, and sometimes even between castes and tribes irrespective of social or caste hierarchy. The component of genetic diversity among castes is usually of the order of 1 to 3%, whereas between castes and tribes it is about 5%. It also indicated that the genetic affinity between castes is explainable sometimes on the basis of ethno-historical factors and in some populations it is higher because of geographical proximity. In order to elucidate other influencing factors, micro level studies on genetic differentiation within or between regional populations have been studied. In a study among five populations of Bihar, Saha et al., (1992) infers that the observed pattern of differentiation based on six polymorphic loci of 19 alleles

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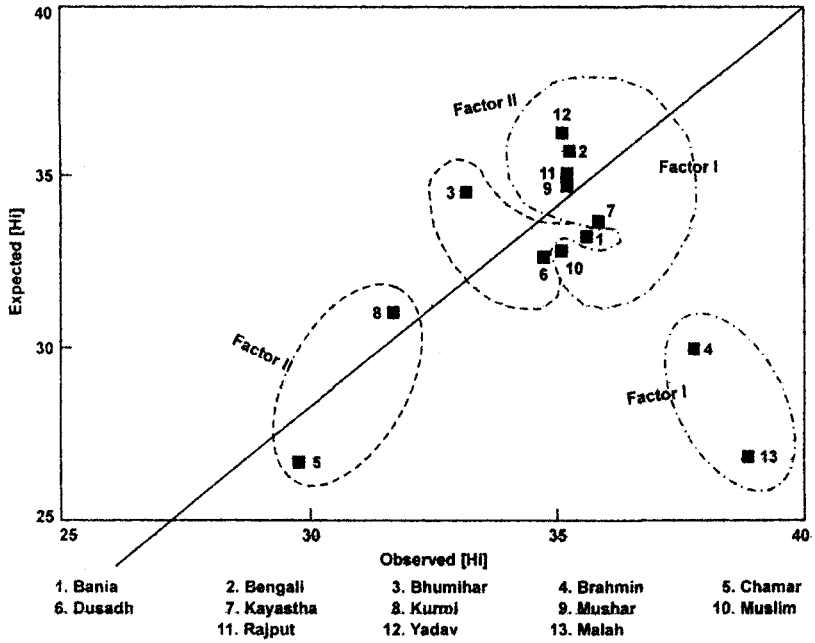

Figure 4. Hetrozygosity values among 13 endogamous populations of Purnia.

have found some significant evidence in harmony with the ethno-historical records of the populations. However most of the above studies are model-free studies. Model-bound studies, which employ hypothesis testing, for investigating the influence of a particular or more population structure variables, are very few. The study show the influence of long range gene flow in the microdifferentiation in Purnia.

In general, in the Gangetic plain, B blood group is more predominant than A (Roychodhury 1983), as for example among Bania, Rajput and Yadav of Uttar Pradesh (Mondal, 1992) and among Chamars of Punjab (Sidhu, 1994), Jats of Harayana (Yadav and Gupta, 1992) and among Brahmin, Bania, Rajput, Kayastha, Sudra and Muslim of Madhya Pradesh (Koley and Srivastava, 1992) and populations of Kashmir (Bhasin and Khanna, 1992). In Bihar high incidence of group B and O among Dusadh and Muslim of Bhagalpur region (Gupta, 1992) and among Oraons of Ranchi and Purnia divisions (Sharma 1976), Pandey et al., 1993, 1995). Such

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high frequencies of Rh negative were also found by other studies among Dusadah (6.2%), Chamars (4.8%) and Mushar (4.7%) of Bhagalpur region, (close to Purnia) in Bihar (Singh and Sinha, 1988). And in other states, among the Chamars (4%) of Punjab (Sidhu, 1994); among Saraswat Brahmins (Bhatia et al., 1976) and in other populations (Mukherjee et al., 1978). Singh and Singh (1988) have reported incidence of 4% color blindness among Gorkhs (3.3%) among Dusadh but comparatively less among Chamars (2.2%) and Mushars (2.7%) in Bhagalpur. Studies in Bihar and other neighboring regions; both in north (Walter et al., 1993) and eastern and southern regions (Balakrishna and Satyanarayana (1994), Das (1958), Devi et al., (1990), Naidu and Veeraju (1978); Naidu et al., (1990); Pingle (1981); Venkateswararao et al., (1981)) suggest that both the phenotypes and gene frequencies of ABO, Rh and PTC and Colorblindness in the Purnia Division is in agreement with other populations in the northern, southern and eastern regions.

Despite the fact that the study is based on only four common loci, the results indicate a clear possibility of identifying population structure variables that influence the genetic diversity at the regional level. In the case of Purnia, this diversity is related to ethno-historical migration for some populations, especially eastern migrants of Muslim and Bengali origin, and in other cases, for example, in the case of the Scheduled Caste group of Chamars, endogamy and isolation are possible factors. Because of the paucity of demographic information on population structure variables in these populations, it is difficult to examine the assumptions of the Harpending and Ward model. However, even if the data were available, it is doubtful that it would explain the results of the present study of regional populations. Even with these limitations, it is interesting that the study shows the predicted linear trend between the expected and observed heterozygosity levels in almost all the cases except in two populations, Brahmin and Malah, where the deviations indicate the influence of long range gene flow on regional diversity. The agreement between cluster analysis, principal component analysis, and the Harpending and Ward model, all suggest that the overall results obtained in this study will remain the same, even if the number of loci are increased. In such case, it is expected to improve the resolution of the common influencing factors of population structure. This is supported by the results obtained by Saha et al.,

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(1992), where a similar ethno-linguistic clustering of the populations (based on four polymorphic loci) was observed.

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Age at Menarche in a Rural Aymara-Speaking Community Located at High Altitude in Northern Chile

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Johannes Gutenberg-University, Mainz

Menarcheal information was collected in 1987 for rural Aymara speaking girls who reside at high altitude in the community of Putre (3,530 m), Parinacota Province, northern Chile. The study was based on the *status quo* investigation of 57 girls, aged 9 to 17 years, who attended a public school in Putre. Median age at menarche, which was estimated by probit analysis, was 13.7 years, about 0.3 year later than that reported in the literature for an urban Aymara sample from La Paz, Bolivia. In contrast to the limited data on median age at menarche in Aymara Indians, retrospective information is available for four comparative Aymara samples with medians ranging from 12.7 to 13.6 years. This considerable range is explained by differences in the nutritional level, by a possible secular effect, and by methodological, anthropological, as well as statistical sources of error in data collection and elaboration. Compared to samples of European ancestry living at high altitude, the Aymara are delayed in menarcheal age. This is probably attributable to the better nutritional status and socio-economic conditions of Europeans in South America.

Key words: median age at menarche, high altitude, Amerindians, Aymara, Chile, Andes

Introduction

A trend toward earlier maturing was observed in Europeans and North Americans over the last hundred years (Eveleth and Tanner 1990). The most commonly used indicator for sexual development in girls has been the age of menarche. An increasingly earlier onset of menarcheal age of about 0.3 year per decade has been found as a

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general trend in industrialised countries (Eveleth and Tanner 1990). Studies have also shown that the onset of menarche is delayed among girls living at high-altitude in South America (Donayre 1966, Peñaloza 1971). In the Peruvian highlands the age at which the secondary sexual characteristics in girls are attained is markedly delayed (Llerena 1973). Furthermore, measurements of luteinizing hormones in Peruvian girls indicate that those girls who live at high altitude attain the adult value one year later, that is by the age of twelve years, than girls living at sea level (Llerena 1973).

Different environmental factors were considered to explain the observed differences in menarcheal age between highlanders and lowlanders. First, there is evidence that later age at menarche in highlanders is caused by poor nutrition in early life. It has been shown that well-nourished girls menstruate earlier than poorly-off ones (Colli 1986, 1988, Dreizen *et al.* 1967). Second, socio-economic differences were considered to affect age of menarche. Highland populations are generally of low socio-economic level (Leistol 1982). When living standards rise, age of menarche becomes lower. Third, the number of siblings was found to influence the onset of menarcheal age. It was noted that girls with large number of siblings have later menarche (Rona and Pereira 1974, Valsík 1965). Fourth, climatic factors, especially altitudinally mediated changes in the hormonal nature in women and men, are discussed as causative factors. Guerra Garcia (1971) for example demonstrated that the excretion of urinary testosterone in adults is significantly diminished at high altitude compared to that at sea level.

The Aymara are a native highland population inhabiting the Central Andes region of South America for centuries. There are about two million Aymara speaking Indians (Hardman 1981), most of them living in western Bolivia and southern Peru. A small number of Aymara speakers resides in northern Chile being estimated according to different sources at 15,000-20,000 (Clair-Vasiliadis 1976) or 5,000 persons (Rothhammer and Schull 1980). The climatic conditions of their natural environment are characterised by low barometric pressure, diminished oxygen pressure, intense radiation, and marked diurnal temperature changes. The subsistence economy of the Aymara is based primarily upon agropastoralism.

Very few studies have been carried out so far on the onset of

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Table I.

Menarcheal status according to age. Results of probit analysis (n = 57) and mean age (n = 45) in Aymara girls from Putre, Chile.

Age (years)	Total	Menarche
9.0- 9.9	11	0
10.0-10.9	5	0
11.0-11.9	5	1
12.0-12.9	11	3
13.0-13.9	4	3
14.0-14.9	6	6
15.0-15.9	5	5
16.0-16.9	6	5
17.0-17.9	4	4
Total	57	27

Pearson goodness-of-fit test:

Chi-square = 12.735, df = 7, P = 0.079

Median age at menarche (years): 13.67

95% confidence limits (years): 12.24 - 16.44

Mean age at menarche (years): 13.02

S.D.: 1.65

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menarche in Amerindian highland populations (Bouloux 1968, Dutt 1980, Frisancho 1976, Gonzales and Ortiz 1994, Greksa 1990). The purpose of the present paper, therefore, was (1) to determine the age at menarche in Aymara speaking girls who reside at high altitude in northern Chile and (2) to compare these data with those of other populations both of Amerindian and European ancestry which live at high and low altitudes.

Subjects and Methods

Sample: The study was carried out as part of a larger research project (Dittmar 1994) between November and December 1987 in the rural community of Putre (3,530 m), Parinacota Province, Department 'Region 1', northern Chile (Fig. 1). The sample includes 57 girls who reside in the village of Putre and other hamlets of the Parinacota Province. The girls were students in a public school in Putre, where they spent most of the year. Approximately 95% of the Aymara girls attending the school in Putre could be investigated. All girls studied, as well as their parents, were born and raised at high altitude (> 3,000 m) where they lived all their lives. Criteria by which the girls were designated to be Aymara was based upon the origin of the maternal and paternal surnames following the method of Schull and Rothhammer (1977). The girls studied have between one and eleven living siblings. Their parents mainly subsist as agriculturalists and pastoralists. All schoolgirls were healthy and well-nourished, having full breakfast and lunch at school each day of the school year (March to December). The meals were prepared by a school cook. Further information on the nutritional status of the girls can be found in Dittmar (1995).

Menarcheal age: The menarcheal age was determined as described by Weiner and Lourie (1969) employing the *status quo* method. The girls were asked whether menstruation had begun or not. Questioning was employed to girls aged 9 to 17 years as recommended by Weiner and Lourie (1969) and Eveleth and Tanner (1976) for cross-sectional data. Birthdates were recorded by interview and later verified through official records.

Statistics: The data was subjected to a probit analysis (Finney 1971) in order to estimate the median age at menarche in the Aymara. This statistical procedure transforms the proportion of girls

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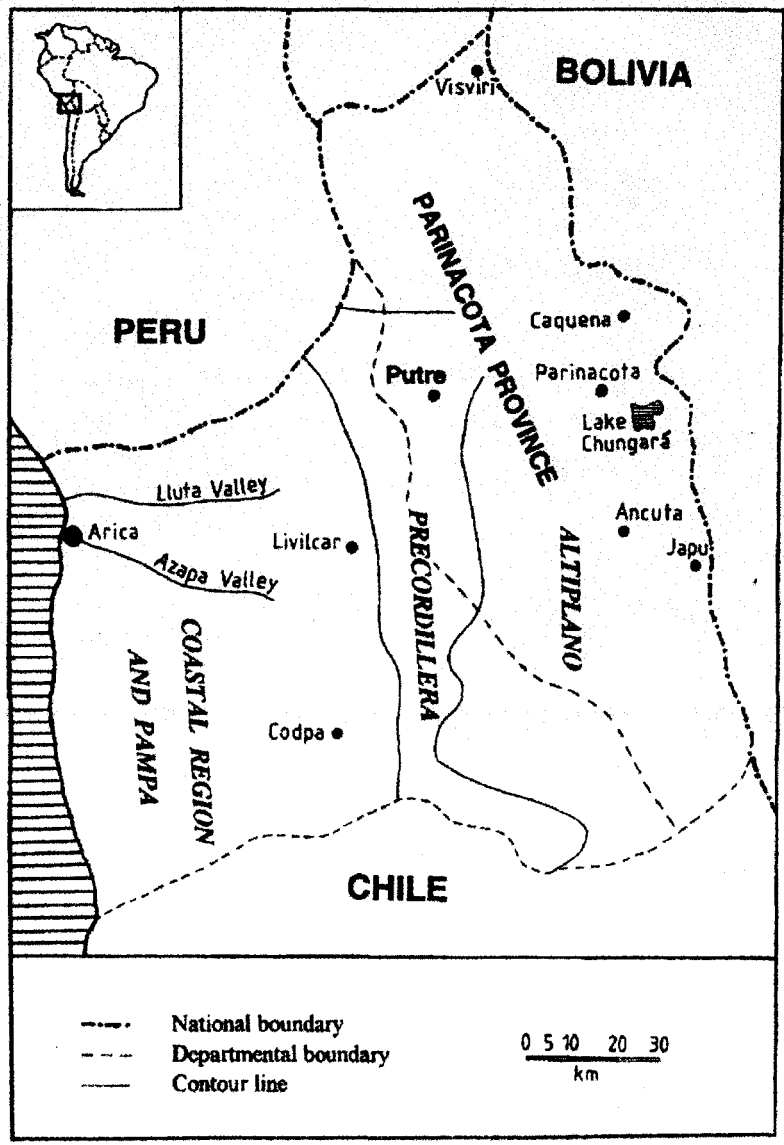

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who experienced their menarche at given ages into probits. The probits are used to derive a regression line which describes arithmetically and, through a series of iterations, the best slope obtained. The regression equation can be used to estimate median age at menarche by solving for the age that corresponds to an untransformed probit value of 0. In addition, a chi-square goodness-of-fit test for the model is calculated to determine whether the various age samples are sufficiently homogeneous to be accepted as randomly drawn from a population represented by the adjusted regression line. If the test has a significance level less than 0.15, a heterogeneity correction is automatically included in the computation of the intervals.

The statistical treatment of the data was performed using SPSS-PC software (Hermann *et al.* 1994) for MS Windows release 6.0 at the University of Mainz computer centre.

Results

Present Aymara sample: Table I shows the total number of Aymara girls surveyed in Putre and the proportion of girls in each age group who had experienced menarche at the time of the survey. All girls aged 14 and over had already begun menstruation, with one exception. The results of the probit analysis are also summarised in Table I. Since the chi-square value for the goodness-of-fit test was significant, a heterogeneity factor was used in the calculation of the confidence limits. The median age at menarche in Putre Aymara is 13.7 years. The retrospective mean age of menarche is 13.0 years (n = 45 girls), that is 0.7 year earlier.

Comparison with other studies: Comparative studies on menarcheal age in Amerindian, *mestizo* and European samples of America, determined by *status quo* and retrospective examinations, with medians (probit estimates) and retrospective means of menarcheal age, respectively, are listed in Table II. Regarding the comparability of median and mean values, it must be taken into account that mean values are averages only of those girls and women who reported having had menarche, and therefore, they are lower than those derived from the *status quo* method which includes those girls who have not menstruated.

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Table 2.

Summary of studies of age at menarche for Latin American samples: median age (probit estimates based on *status quo* method) and mean age (based on retrospective studies).

Sample	Altitude	N	Age at menarche (years)		Reference
Amerindian ancestry					
Aymara (Putre, Chile) rural	3,530 m	57	13.7	median	Present study
Aymara (La Paz, Bolivia) urban	3,600 m	375	13.4	median	Greksa 1990
Aymara (La Paz, Bolivia) urban	3,600 m	375	12.7	mean	Greksa 1990
Aymara (Putre, Chile) rural	3,530 m	45	13.0	mean	Present study
Aymara (La Paz, Bolivia) urban	3,850 m	32	13.6	mean	Bouloux 1968
Aymara (Dept. of La Paz, Bolivia) rural	> 3,000 m	326	12.8	mean	Dutt 1980
Aymara (Dept. of La Paz, Bolivia) urban	> 3,000 m	131	13.1	mean	Dutt 1980
Quechua (Dept. of Cochabamba, Bolivia) urban	2,000-3,000 m	69	12.7	mean	Dutt 1980
Quechua (Dept. of Cochabamba, Bolivia) rural	2,000-3,000 m	232	13.2	mean	Dutt 1980
Quechua (Lima, Peru) urban	150 m	[a]	13.6	mean	Gonzales & Ortiz 1994
Quechua (Cusco, Peru) urban	3,400 m	[b]	14.0	mean	Gonzales & Ortiz 1994
Quechua (Cerro de Pasco, Peru) urban	4,340 m	[c]	14.5	mean	Gonzales & Ortiz 1994
Quechua (Nuñoa, Peru) rural	4,000-5,500 m	n.d.	13.7	mean	Frisancho 1976
Zapotec (Valley of Oaxaca, Mexico)	1,420-1,740 m	328	14.5	median	Malina *et al.* 1980
Maya (Chimaltenango, Guatemala) rural	n.d.	137	14.5	median	Sabharwal *et al.* 1966
Mestizo					
Valley of Oaxaca (Mexico) rural, urban	1,420-1,740 m	315	14.3	median	Malina *et al.* 1977
Mérida, Yucatan (Mexico) urban	8 m	993	12.6	median	Díaz Bolio 1964

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Table 2 (continued)

Summary of studies of age at menarche for Latin American samples: median age (probit estimates based on *status quo* method) and mean age (based on retrospective studies).

Sample	Altitude	N	Age at menarche (years)		Reference
European ancestry					
La Paz (Bolivia) migrants[d], urban	3,600 m	84	13.8	median	Greksa 1990
La Paz (Bolivia) sedentes, urban	3,600 m	199	13.1	median	Greksa 1990
Santa Cruz (Bolivia) sedentes	400 m	172	12.3	median	Greksa 1990
Lima (Peru) urban	150 m	[a]	13.0	mean	Gonzales & Ortiz 1994
Cusco (Peru) urban	3,400 m	[b]	13.9	mean	Gonzales & Ortiz 1994
Cerro de Pasco (Peru) urban	4,340 m	[c]	14.6	mean	Gonzales & Ortiz 1994
Santiago (Chile) urban, middle class	560 m	354	12.6	median	Rona & Pereira 1974
without shovel-shaped teeth	560 m	248	12.5	median	Rona & Pereira 1974
with shovel-shaped teeth	560 m	93	13.0	median	Rona & Pereira 1974
La Plata (Argentina) urban, middle class	lowland	6494	12.7	median	Lejarraga *et al.* 1980

[a] The total sample includes 72 natives of Lima; sample numbers for subsamples of Quechua and European ancestry not stated.

[b] The total sample includes 81 natives of Cusco; sample numbers for subsamples of Quechua and European ancestry not stated.

[c] The total sample includes 143 natives of Cerro de Pasco; sample numbers for subsamples of Quechua and European ancestry not stated.

[d] The migrants were born at low altitude and migrated later to high altitude.

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As can be seen from the table, the median age of menarche in the rural Putre Aymara sample is 0.3 year later than in the urban La Paz Aymara sample reported by Greksa (1990). Concerning the third Aymara sample, studied by Bouloux in La Paz (1968), there exists only a retrospectively determined mean age of menarche of 13.6 years. This value is higher than the mean ages evaluated in La Paz Aymara samples by Greksa (12.7 years) and Dutt (1980; 12.8 years for rural and 13.1 years for urban girls), and in the Putre Aymara sample (13.0 years) of the present study. In this context one should bear in mind that Bouloux collected his data in the sixties, about twenty years earlier than Greksa and the author of the present Putre sample. Aside from the problems inherent in comparing older with newer studies in view of methodological differences, a secular effect cannot be excluded to explain the later menarche in Bouloux's sample. Bouloux's mean value do not differ very much from that of Quechua Indians (13.7 years) from Nuñoa in the Peruvian highlands. By contrast, late onset of menarche is found in Quechua Indians who reside at high altitude in Cusco (14.0 years) and Cerro de Pasco (14.5 years). Quechua Indians living at lower altitudes in Bolivia menstruate earlier (12.7 years for urban and 13.2 years for rural girls). In comparison to South Amerindians, menarche is later in Indians and *mestizos* who live in Guatemala and in intermontane valleys in Mexico where the median ages range from 14.3 to 14.5 years. There is only one exception, that are urban Spanish-Mayan *mestizo* girls from Mérida in the Mexican lowlands who menstruate very early having a median age of 12.6 years. Compared to Amerindians and *mestizos*, girls of mainly European origin in South America generally menstruate earlier (Greksa 1990). This finding is in accordance with results of Rona and Pereira (1974) who found that in Chile those girls with shovel-shaped teeth exhibit later menstruation than girls without shovel-shaped teeth. Because shovel-shaped teeth can be used as an indicator of indigeneity, this could mean that girls with higher amounts of Amerindian genes may have a later onset of menarche. In South American girls of European ancestry latest onset of menarche occurs in high altitude samples, as Greksa (1990) demonstrated. Gonzales and Ortiz (1994) compared the age at menarche of samples of predominantly European (Spanish) and Amerindian (Quechua) ancestry living at different altitudes in

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Peru. They found that the onset of menarche occurs later at high altitude independent of ethnic background.

Discussion

The results presented in this paper show that the median age at menarche in the girls of a Chilean Aymara speaking community is 13.7 years. The size of the present Aymara sample is small, but nearly all girls attending the school in Putre could be examined, so that the sample can be considered to be representative. Nevertheless, the results must be considered tentative, given the small number of Aymara girls surveyed.

Information on median age at menarche estimated by *status quo* method for Amerindian highland girls is limited because age at menarche in most studies is calculated on the basis of retrospective examination. In Aymara Indians, aside from this paper, there is only one study based on the *status quo* method; both studies showing median ages at menarche of 13.4 and 13.7 years. In contrast, information on mean age at menarche (retrospective method) is given from five Aymara samples which exhibit a considerable range from 12.7 to 13.6 years. These differences in the Aymara cannot primarily be attributed to the effects of altitudinal differences and varying partial oxygen pressure because all Aymara samples came from the highlands. Therefore, it can be supposed that the observed variation in age at menarche may be primarily due to differences in the nutritional status and socio-economic level. Furthermore, since the comparative studies on the Aymara were published between 1968 and 1990, the observed differences may be evidence of a positive secular trend which coincide with a general improvement of living and hygiene conditions. Aside from these explanations, methodological causes responsible for the observed range in menarcheal age in Aymara Indians must be born in mind. Information on chronological age could not be verified in all comparative studies through birth certificates. In addition, recalculation of probit estimates of median ages at menarche for various comparative samples from Latin America yielded moderate differences, which are probably due to differences in the applicated computer software. Another source of error refers to the retrospective procedure of investigating the menarcheal age. Many girls or women presumably did not remember

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the exact age at menarche so that they erroneously gave false information on the onset of menarche (Bergsten-Brucefors 1976).

In order to establish more general conclusions on the menarcheal age in Amerindians and especially to clear up the effect of high altitude, more studies on median ages at menarche from Aymara and other Amerindian populations are needed. The research designs should be controlled for several factors like ethnicity, socio-economic level, nutritional status, and environmental conditions in order to evaluate the sources for differences in menarcheal age in different samples.

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The End of the Neanderthalers: A Speculative Essay

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It is suggested that modern *Homo sapiens* evolved from a single small population of *Homo erectus*, living at a high latitude during the last Interglacial period, which lost its body fur while retaining the sematic hair, at the same time perhaps reducing the chromosome number from 24 to 23 pairs. This meant that when, at the start of the last Ice Age, they migrated southwards again, viable hybridization with their *H. erectus* predecessors, still living over most of the rest of the world, might not have been possible. These *H. sapiens* had pale skins, no longer shielded from the sun by fur, and evolved protective skin pigmentation. In several physiologically different ways, the Neanderthalers are to be regarded as advanced and specialized *H. erectus*, probably with warm fur coats, rather than as primitive *H. sapiens*.

Key Words: hybridization, extinction, hair, fur, facial flushing, skin coloration.

As is generally agreed, the Neanderthalers died out some time before 30,000 years ago, soon after Cro-Magnon *Homo sapiens* made contact with them during the latter part of the last Ice Age. There is very little fossil or genetic evidence of hybridization between the two populations, and the Neanderthalers seem to have contributed little or nothing to the modern *Homo sapiens* genotype (Stringer & Gamble 1993).

One possible explanation for this puzzling observation could be that when the modern *H. sapiens* were evolving a genetic barrier may have developed which prevented viable hybridization with *Homo erectus* level populations from which they must have derived. This is how speciation often does occur, when a small population becomes isolated, and evolves allopatrically before being brought back in to secondary sympatric contact with the rest of the species. Possibly the 24 pairs of chromosomes characteristic of the chimpanzees and

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gorillas, and perhaps of all the later hominids, including *H. erectus* and the Neanderthalers, could have been reduced to the 23 pairs of modern *H. sapiens* – perhaps by two of the smaller chromosomes joining up as one. Such a chromosomal mismatch, although it might not have prevented mating between *H. erectus*, including the Neanderthalers, and the new *H. sapiens*, could well have produced inviable hybrids or sterile mules. Something like this was suggested by the well-known Finnish Quaternary biologist Björn Kurtén in his novel, *The Dance of the Tiger* (Pantheon, New York 1980), concerned with Neanderthalers meeting with the Cro-Magnons at the end of the Ice Age. That was no more than science fiction but it could have happened, and it would explain the otherwise surprisingly rapid disappearance of the Neanderthalers.

A Small Isolated Population

Such a transformation is most likely to have occurred in a single numerically-small population. At the same time as the suggested genetical re-arrangement there seems to have been a cultural transformation as well, perhaps related to the acquisition of symbolic language, from Palaeolithic stasis over most of the Pleistocene to where we are now, in tens rather than hundreds of thousands of years. This implies that all existing *H. sapiens* should be descended from one small isolated population, which then spread out over most of the world, replacing the *H. erectus* already there, including the Neanderthalers. There are some persuasive arguments (Goodhart 1996) to support this suggestion which, although to some extent speculative, is firmly based upon objective evidence. And anyway, Darwin himself observed, in a letter to A. R. Wallace dated 22nd December 1857, that he was "a firm believer that without speculation there is no good and original observation".

Hair and Fur

Firstly, although all modern humans have more or less naked bodies, lacking the fur found in all other Primates, humans of many though not all races have plenty of hair on their heads and around the genitalia, and in the armpits, of the long coarse "sematic" (i.e. signalling) type, quite different from the fine soft heat- insulating fur

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covering the whole body in most other mammals. The mane of hair on our heads, and the beards and moustaches of adult men, must certainly once have had an epigamic function for display in intra-specific competition for mates, as in many monkeys and apes. The pubic and armpit hair, equally well grown in both sexes but only after puberty, had however a different function, in providing a surface for the oxidative development and dissemination of the scent produced by apocrine glands in these parts, of social and possibly pheromonal significance. And the "lanugo" coat, which is now usually shed before birth, or immediately afterwards, would then represent a vestige of the fur keeping the baby *H. erectus* warm, before it was replaced by the adult fur coat, now lost by *H. sapiens*.

Flushing and Blushing

Secondly, both men and women flush and blush in the face when emotionally aroused, as do a few monkeys sometimes on their bare bottoms as well, this being controlled by the sympathetic and parasympathetic nervous systems. A man goes red with rage, but also pale with fear, the two often alternating in quick succession, thereby enhancing the visual effect. And a modest maiden may blush when embarrassed by a lover's demands, only serving to increase his ardour while by no means always indicating that she hopes he will desist. As Darwin (1872) observed, "No happy pair of young lovers ... ever courted each other without many a blush".

Skin Pigmentation

But if facial flushing had a signalling effect, as it certainly does in other Primates, this could only have been seen under an unpigmented skin. Darwin knew that Africans blushed, but invisibly, from which he concluded that this could have no sematic significance in humans, which he assumed had evolved in Africa and so would presumably have been as dark as the people now living there. But it could have been the other way round, if sematic facial flushing had first evolved under a pale skin, with the dark pigmentation acquired later. That would have been so if the original hominids had had coats of fur, like all the other African primates, which would have shielded their skins from the sun with no need for pigmentation. And when the *H. erectus*

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moved out of Africa they would have had fur coats, which might well have grown thicker in the colder conditions of northern Europe and Asia. The suggestion is that a small detached population of furry *H. erectus*, living at a high latitude 100,000 years or so ago, during the last interglacial period, then lost their body fur. And although the climate was rather warmer, the sun would have risen no higher and been no stronger than it is today, so their now naked skins would have needed no pigmentation for protection. Darwin (1871) thought that the fur might have been
lost as a result of sexual selection, by the men preferring their females with naked bodies. This is as good an explanation as any, and it is significant that even nowadays a man is much put off by a woman with hair on her chest or belly, although women don't mind hairy men. The sematic hair, men's beards etc., was however retained, and the hair on women's heads grew much longer, perhaps also through sexual selection.

Bar to Hybridization

It was in such a small isolated population that the chromosomal re-arrangement may be supposed to have occurred, resulting in a bar to viable hybridization with the rest of the species. But then, at the start of the last Ice Age some 70,000 years ago, the newly evolved *H. sapiens* would have had to migrate down south again, where their now naked skins acquired pigmentation for protection against the stronger tropical sun: and they did so in at least four physiologically different ways. Although Africans are black from the start, apart from the palms of their hands and soles of their feet which remain relatively unpigmented, the aboriginal Australians are born a pale yellowish brown, but soon go as black as any African by tanning on exposure to the sun. In southern Asia they are also born very dark, but there is linguistic and historical evidence that a portion at least of the Sinhalese populations came from Northern India, where the people are quite pale, and acquired their present dark colour over not much more than a couple of thousand years. The natives of tropical America are a dark chocolate colour rather than black or brown. This suggests that the ancestors of them all had pale skins and so must have lived well away from the tropics, only later evolving protective pigmentation in their several different ways.

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In moving south, the new *H. sapiens* would have met up with the much more numerous and still furry *H. erectus* already there, and might soon have lost their nakedness though interbreeding. But if this was prevented by some genetical bar evolved during isolation. the two species would have remained separate, with *H. erectus* eventually replaced in competition with *H. sapiens*. The Neanderthalers, however, who had remained behind at higher latitudes would have been well adapted to life under the increasingly colder conditions, with their warm body fur. As they are usually depicted, with largely naked bodies and little or no proper clothing, they would surely have felt a bit chilly as the only mammals living around the edge of the ice cap with no warm fur coats. So the Neanderthalers, representing advanced and specialized *H. erectus* rather than primitive *H. sapiens*, would have been the last of their species to disappear in competition with the culturally more advanced *H. sapiens*, with whom they were also unable to hybridize.

The End of the Neanderthalers

This scenario does provide an explanation for the end of the Neanderthalers which, however speculative, is firmly based upon objective observations which are not otherwise easily accounted for. These are, firstly the loss of body fur in modern humans; secondly the evolution of protective skin pigmentation by several different routes in peoples living in the tropics; and lastly the retention of sematic facial flushing where the skin is darkly pigmented so that this is no longer visible. And the chromosome number must certainly have been reduced from 24 to 23 pairs at some time since the hominid line separated from the chimpanzees and gorillas. Although the suggestion that this may have happened only relatively recently, when *H. sapiens* was differentiating from *H. erectus*, can only be speculative, it could explain why the Neanderthalers appear to have contributed little or nothing to the genetical inheritance of modern humans.

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A Brief Discussion of Goodhart's Thesis

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Institute for the Study of Man

The author aptly cites Darwin as stating that "without speculation there is no good and original observation," and raises a long-standing question: the earliest hominoids must surely have had protective coats of fur, but when did they lose these? His answer is provocative: fur may have survived amongst *Homo erectus* and even as late as the Neanderthal hominids, which latter he sees as advanced *Homo erectus*. This is a startling hypothesis, with no real evidence one way or another – although his opinion that modern *H. sapiens* did not interbreed with Neanderthals is now widely supported, being reinforced by recent arguments based on genetic data. Even more controversial, however, is his proposal that the forebears of *all* contemporary human populations might have achieved *H. sapiens* status by virtue of common descent from a small group living, not in Africa, but in a severe northerly environment – whence some of their descendants spread back into the tropics to replace the more primitive ancestral population and re-adapt to equatorial conditions. Few would dispute the evidence for an expansion of Caucasoid and Mongoloid populations southwards in recent millennia – and their subsequent admixture with pre-existing local *sapiens* populations better adapted to equatorial conditions is well established. Also *Homo erectus* was undeniably replaced worldwide by H. sapiens, and the above proposals, emanating from an author of acknowledged status, will certainly stimulate discussion. But his suggestion that the ancestors of contemporary sub-Saharan Negroes, Negritoes and Australoids once lived in northern latitudes is unlikely to be received with enthusiasm. While he rejects Carleton Coon's belief that some remote late hominid populations, such as the ancestors of the Australoids, were helped over the threshold to *sapiens* status by genetic admixture with incoming *H. sapiens* from Eurasia, most contemporary theorists will likely contest his view that true *sapiens* status was attained *after* migration out of Africa, and not before. However, speculation remains the parent of observation.

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The Celtic Calendar and the English Year

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The author examines the linguistic and historical evidence for the names and implied meanings of the Celtic and Anglo-Saxon months, seasons, days, solstices, equinoxes and festivals, and concludes that the major divisions of the English traditional year are of Anglo-Saxon rather than Celtic origin.

Key Words: Celts, Anglo-Saxons, Festivals, Days of the Week, Names of the Months and Seasons.

Introduction

England has a rich tradition of annual customs and festivals which include Yule, Lent, Easter, May Day, Midsummer, Harvest and Halloween, as well as many local minor festivals. The majority of published references on English folk tradition tend to attribute either Roman or Celtic origins to these annual events. For example, Yule is often identified with the Roman *Saturnalia*, and May Day with *Floralia*. However, it is the Celtic calendar that is most often used to explain the origins of the English traditional year.

A recent study of the ritual year by Ronald Hutton of Bristol University (Hutton, 1996), has involved a thorough re-examination of the historical records, and has largely discredited the concept of the Celtic calendar. However, Hutton does not fully explore the Anglo-Saxon evidence. The purpose of this essay is to review the linguistic evidence, and use the results to suggest a basis for the English traditional year.

The Celtic Calendar

The native languages of Britain and Ireland descend from two branches of the Indo-European family (Renfrew, 1987), Celtic and Germanic (see table 1). The Celts (Κελτοι) are first recorded in the 5th century BC by the Greek historian Herodotus, who locates them in the area of the upper Danube (Selincourt, 1954, 142). Later Roman

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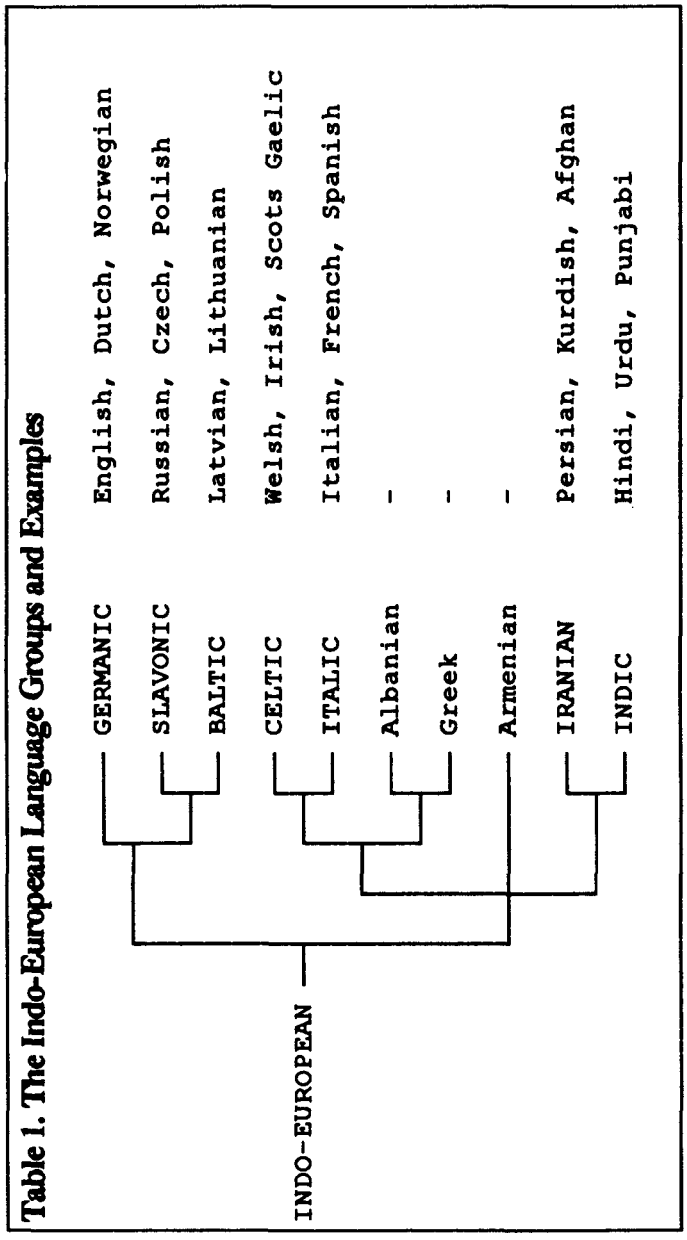
Table 1. The Indo-European Language Groups and Examples



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historians referred to a number of peoples within their empire as being either Celts or Gauls. Archaeologists have therefore attempted to find evidence of these early Celts in central Europe, and have identified two possible cultures known as *Hallstatt* and *La Tène* (Renfrew, 1987, 211-249). However, the Celtic language group was not recognised by that name until the beginning of the 18th century (Edward Lhuyd, 1707), and its relationship to these archaeological cultures is still a subject of much debate (James, 1999). Nevertheless, at their greatest extent, Celtic languages were spoken throughout what is now northern Italy, France, Spain, Britain and Ireland.

Evidence

> *'No man will travel this country,' she said, 'who hasn't gone sleepless from Samain, when the summer goes to its rest, until Imbolc, when the ewes are milked at spring's beginning; from Imbolc to Beltane at the summer's beginning and from Beltane to Brón Trogain, earth's sorrowing autumn.'*

The above passage comes from the 10th to 11th century collection of Irish heroic tales known as the Ulster Cycle (Kinsella, 1970, 27). During the wooing of Emer (*Tochmarc Emire*) by the hero Cúchulainn, he is required to sleep for a year before she will agree to marry him. In describing the year Emer also provides the earliest reference to all four of the Irish pagan festivals, that marked the changing of the seasons. Three of these festivals names have survived in Ireland and highland Scotland, as the months May, August and November. However, in the later sources *Brón Trogain* is known by the name *Lúgnasad* (see tables 2 and 5).

Discussion

In the 19th century during the 'Celtic Revival' these early Irish festivals were rediscovered by folklorists and academics such as Sir James Frazer, who between 1890 and 1915 published a twelve volume study of magic and religion entitled *The Golden Bough* (Frazer, 1922). This and similar works attempted to reconstruct a pan-Celtic year that was said to have existed not only in Ireland and Scotland, but throughout Britain and the former Celtic speaking parts of Europe.

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Table 2. The Old Irish Festivals

Old Irish	Irish	Scots Gaelic	Interpretation
Imbolc	-	-	Ewes milking
Beltane	Bealtaine	Bealltainn	Bright fire
Lúgnasad	Lúnasa	Lùnasdal	Lug's festival
Samain	Samhna	Samhainn	Summer end

Table 3. The Celtic Revival Calendar

Celtic Year	Date	Assumed Equivalent
Winter Solstice	21st December	Yule
Imbolc	1st February	Lent
Spring Equinox	21st March	Easter
Beltane	1st May	May Day
Summer Solstice	21st June	Midsummer
Lúgnasad	1st August	Lammas
Autumn Equinox	22nd September	Harvest
Samain	1st November	Halloween

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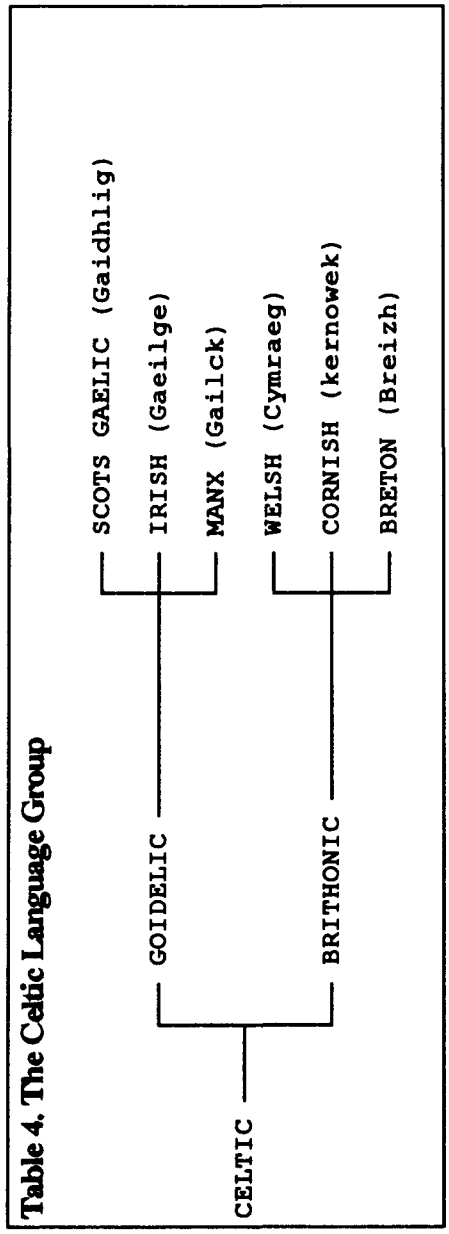

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Table 5. The Celtic Months, Seasons and Days

Welsh	Cornish	Scots Gaelic	Irish	Equivalent
Ionawr	Genver	Faoilteach	Eanáir	January
Chwefror	Whever	Gearran	Feabhra	February
Mawrth	Merth	Màrt	Márta	March
Ebrill	Ebrel	Giblean	Aibreán	April
Mai	Me	Cèitean	Bealtaine	May
Mehefin	Metheven	Òg-mhios	Meitheamh	June
Gorffennaf	Gortheren	Iuchar	Iúil	July
Awst	Est	Lùnasdal	Lúnasa	August
Medi	Gwyngala	Sultainn	Meám Fhómhair	September
Hydref	Hedra	Dàmhar	Deireadh Fhómhair	October
Tachwedd	Du	Samhainn	Samhna	November
Rhagfyr	Kevardhu	Dùdlachd	Nollag	December

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Table 5. Th

Gwanwyn	Gwaynten	Earrach	Earrach		Spring
Haf	Haf	Samhradh	Samhradh		Summer
Hydref	Kynyaf	Foghar	Fómhar		Autumn
Gaeaf	Gwaf	Geamhradh	Geimhreadh		Winter
Dydd Sul	De Sul	Di-dòmhnaich	Dé Domhnaigh		Sunday
Dydd Llun	De Lun	Di-luain	Dé Luain		Monday
Dydd Mawrth	De Merth	Di-màirt	Dé Máirt		Tuesday
Dydd Mercher	De Mergher	Di-ciadain	Dé Céadaoin		Wednesday
Dydd Iau	De Yow	Di-ardaoin	Dé-ardaoin		Thursday
Dydd Gwener	De Gwener	Di-haoine	Dé hAoine		Friday
Dydd Sadwrn	De Sadorn	Di-sathurna	Dé Sathairn		Saturday

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This 'Celtic Calendar' was believed to have included the winter and summer solstices, and the spring and autumn equinoxes, as well as the four recorded festivals that marked the changing seasons. In addition, it was thought that bonfires had been a central part of all these festivals, giving rise to the idea of the *Fire Festivals* (Frazer, 1922, 609-641). The resulting calendar (see fig 1 and table 3) has been used extensively since the 19th century to explain the origins of the English traditional year.

However, this calendar has now been called into question by Ronald Hutton (1996, 408-411), whose work has highlighted a number of flaws in the original thinking. Firstly, the early Irish texts do not mention festivals on the solstices or equinoxes, hence the lack of Old Irish names for these. Secondly, *Imbolc, Beltane, Lúgnasad* and *Samain* are not found in the Brithonic branch of the Celtic language group (see tables 4 and 5), and are only assumed to have been pan-celtic festivals. Thirdly, these festivals, which were not necessarily observed by the Celtic Britons, are then assumed to have passed into English folk tradition.

The concept of the 'Celtic Calendar' is now so deeply imbedded in both popular and academic belief, that it is repeated throughout the literature on Celtic culture, history and archaeology, but with no reference back to original source material. So much so that many eminent archaeologists and historians have reproduced the calendar in their various works, in particular Nora Chadwick, Lloyd Laing and Graham Webster, and more recently Professor Barry Cunlifffe at Oxford University (Cunliffe, 1997, 188-190). Nevertheless, in Hutton's final conclusions (1996, 408-411) he clearly demonstrates that the 'Celtic Year' is a modern scholastic construction.

The English Year

The English or *Angli* are first recorded in 98 AD, when the Roman historian Tacitus describes them in his study of the Germanic peoples in *Germania* (Mattingly, 1970, 134-5). Tacitus locates the *Angli* in what is now the border area between Germany and Denmark, part of which still bears the name Angeln. In the 5th century AD the Anglo-Saxons (Angles, Saxons and Jutes) began to leave their homelands in north Germany and Denmark, and settle in

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Table 6. The Anglo-Saxon Months

Bede	Anglo-Saxon	Translation	Equivalent
Giuli	Æfterra Geola	Later Yule	January
Solmonað	Solmonað	Sol-month	February
Hreðmonað	Hreðmonað	Hreth-month	March
Eostremonað	Eastermonað	Easter-month	April
Þrimilchi	Þrimilce	Three-milkings	May
Liða	Ærra Liða	Earlier Litha	June
Liða	Æfterra Liða	Later Litha	July
Weodmonað	Weodmonað	Weed-month	August
Halegmonað	Haligmonað	Holy-month	September
Winterfilleð	Winterfylleð	Winter-full	October
Blodmonað	Blotmonað	Blood-month	November
Giuli	Ærra Geola	Earlier Yule	December

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lowland Britain following the collapse of Roman rule. Their arrival and settlement in Britain is described by the Northumbrian cleric Bede in 731 AD (King, 1930, 68-74). The Anglo-Saxons called their new land *Englalond* and their language *Englisc*, after the Angles. However, the Celtic Britons and Irish referred to them as Saxons, giving rise to the Welsh *Saeson* and the Scots Gaelic *Sasunnach*. While the nature of the Anglo-Saxon settlement is still hotly debated (folk migration versus dominant élite), they were the first to identify themselves as being English.

Evidence

The earliest description of the English (Anglo-Saxon) year is given by Bede in 725 AD, who in a text on the church calendar, *De Temporum Ratione* (Jones, 1976, Chapter 15), also described the Anglo-Saxon pagan year. The year started at Yule (*Giuli*) in the middle of winter, and was preceded by a festival known as Mothers Night (*Modra Nect*). Half way through the year was the festival Litha (*Lida*) in the middle of summer. The year consisted of 12 lunar months which approximated to those of the Julian calendar (see table 6).

Bede also described what he thought to be the origins of the month names. Yule was not only the name for the middle of winter but also the months before and after the festival. Next came the month of mud when cakes were offered to the gods. The following two months were named after the Anglo-Saxon goddesses Hretha and Eostre, the spring goddess. Then came the month when cattle had to be milked three times a day. The summer festival Litha, like Yule, was flanked by two months bearing the same name. Weed-month was simply the time when weeds grew most, and Holy-month when offerings were made to the gods. Finally came the month of the first winter full moon, and the month of blood when animals were slaughtered or sacrificed.

Bede goes on to explain that the pagan English year was divided into just two seasons, winter and summer. The earliest references to Lent and Harvest occur in 9th century texts, Lent being the season when the days began to lengthen and Harvest when the crops were gathered in (see table 7). In *Byrhtferd's Handboc* (Kluge, 1885, 298-

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Table 7. The Anglo-Saxon Seasons

Anglo-Saxon	Translation	Equivalent
Lencten	Lent	Spring
Sumor	Summer	Summer
Hærfest	Harvest	Autumn
Winter	Winter	Winter

Table 8. The Anglo-Saxon Solstices and Equinoxes

Anglo-Saxon	Translation	Equivalent
Emniht / Efniht	Even-night	Spring Equinox
Middansumor / Midsumor	Midsummer	Summer Solstice
Emniht / Efniht	Even-night	Autumn Equinox
Middanwinter / Midwinter	Midwinter	Winter Solstice

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Table 9. The Latin and Anglo-Saxon Days

Latin	Planet	Anglo-Saxon	Equivalent
Dies Solis	Sun	Sunnandæg	Sunday
Dies Lunae	Moon	Monandæg	Monday
Dies Martis	Mars	Tiwesdæg	Tuesday
Dies Mercuri	Mercury	Wodnesdæg	Wednesday
Dies Iovis	Jupiter	Þunresdæg	Thursday
Dies Veneris	Venus	Frigedæg	Friday
Dies Saturni	Saturn	Sæterndæg	Saturday

Table 10. The Germanic Gods

Anglo-Saxon	Old Norse	German	Characteristics
Tiw	Tyr	Tiwaz	God of war and sky
Woden	Óðinn	Wotan	Foremost god
Þunor	Þorr	Donar	God of thunder
Frig	Frigg	Frija	Fertility goddess

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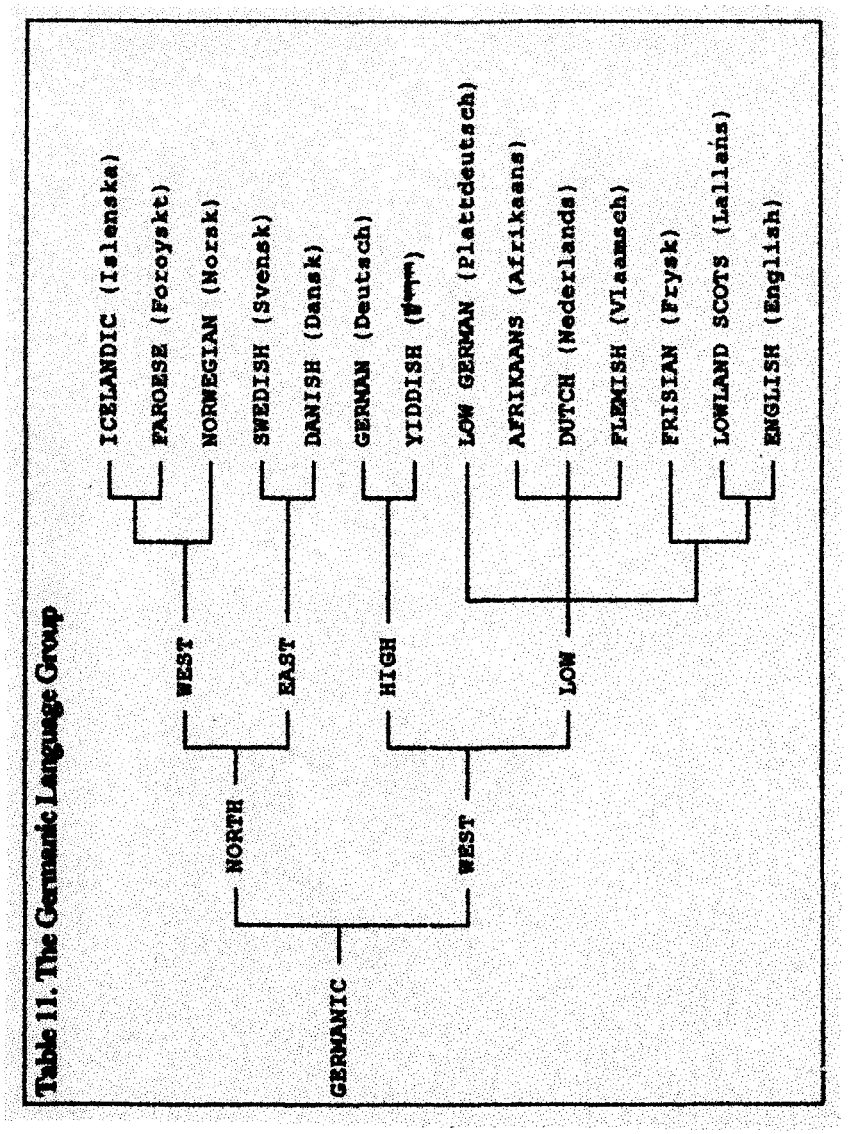

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Table 12. The Germanic Festivals, Seasons and Days

English	Dutch	German	Swedish	Norwegian
Yule	(Kerstmis)	Julfest	Jul	Jul
Easter	(Pasen)	Ostern	(Påsk)	(Påske)
Lent	Lente	Lenz	Vår	Vår
Summer	Zomer	Sommer	Sommar	Sommer
Harvest	Herfst	Herbst	Höst	Høst
Winter	Winter	Winter	Vinter	Vinter
Midsummer	Midzomer	Mittsommer	Midsommar	Midtsommer
Midwinter	Midwinter	Mittwinter	Midvinter	Midtvinter
Sunday	Zondag	Sonntag	Söndag	Søndag
Monday	Maandag	Montag	Måndag	Mandag
Tuesday	Dinsdag	Dienstag	Tisdag	Tirsdag
Wednesday	Woensdag	Mittwoch	Onsdag	Onsdag
Thursday	Donderdag	Donnerstag	Torsdag	Torsdag
Friday	Vrijdag	Freitag	Fredag	Fredag
Saturday	Zaterdag	Samstag	Lördag	Lørdag

The names in brackets are Christian festival names of Latin and Hebrew origin.

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Table 13. The Surviving Anglo-Saxon Season and Festival Names

Anglo-Saxon	Medieval	Present
Geola	Yole	Yule
Lencten	Lenten	Lent
Eastre	Eastren	Easter
Sumor	Somer	Summer
Middansumor	Midsomer	Midsummer
Hærfest	Heruest	Harvest
Winter	Winter	Winter
Middanwinter	Midwinter	Midwinter

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337), a scientific manual written in 1011 AD, all four seasons are described as *pa fower timan... lengten, sumor, hærfest & winter*. The earliest references to Midwinter and Midsummer also occur in 9th century texts, while the autumn equinox is first recorded in a charter of Bishop Denewulf in 902 AD (Kemble, 1839-48, 151) where it appears as *hæfestes emnihte* (see table 8). *Byrhtferd's Handboc* also describes the relationship between the seasons, solstices and equinoxes, and clearly interprets the Latin word solstice as Midsummer; *pæt ys on lyden solstitium & on englisc midsumor.*

In about the 3rd century AD when Germanic soldiers are known to have been recruited by the Roman Legions, various Germanic tribes began to adopt the Roman seven day week (Turville-Petre, 1964, 101) with its days named after the planets (see table 9). Saturday, Sunday and Monday were named after the same planets as their Latin equivalents, while Tuesday, Wednesday, Thursday and Friday were named after the Germanic gods Tiw, Woden, Thunor and Frig (see table 10). When the Anglo-Saxons began to settle in lowland Britain during the 5th century AD, they brought their week with them. These names have survived down through the centuries and are found throughout the Germanic language group.

Discussion

In his chapter on the origins of Christmas, Ronald Hutton suggests that Bede had only sketchy knowledge of the practices which he described. He argues that 'Mothers' Night' could in fact refer to the Virgin Mary and the Nativity, and that it was not until the 11th century that "Danish rule over England resulted in the introduction of the colloquial Scandinavian term for Christmas, Yule" (Hutton, 1996, 6). Hutton also doubts Bede's interpretation of Eostre as the spring goddess, and suggests that it may be the opening or beginning month, as the name is cognate with the East and the dawn sky (Hutton, 1996, 180). However, it is important to note that Bede was writing about the Anglo-Saxon pagan year in the early 8th century AD, well before Danish settlement began in England. While it is true that Bede may have been speculating about the origins of the pagan months and festivals, he had no doubt as to the actual month names, and provides the earliest record of Yule and Easter (Jones, 1976 and

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Fig 1. The Celtic Revival Year

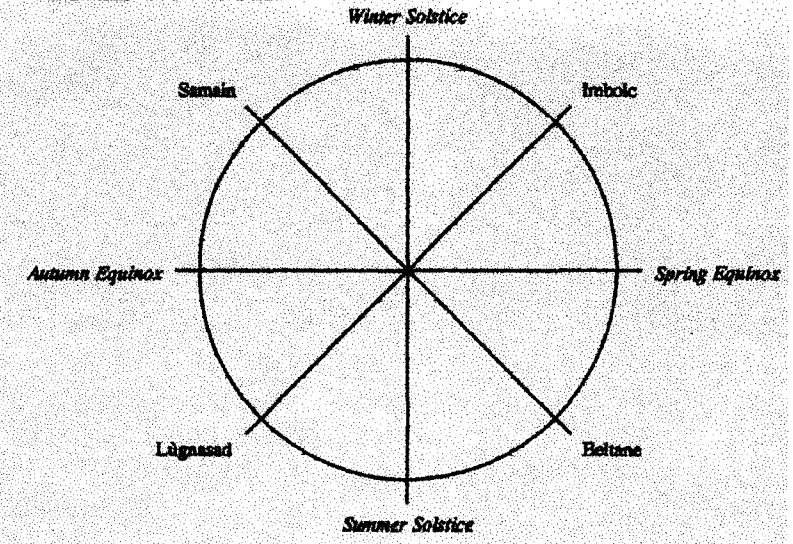
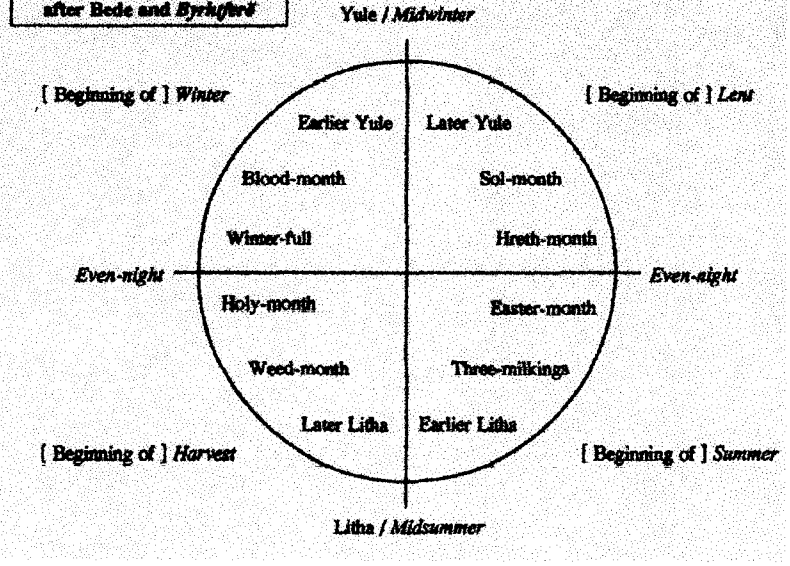


Fig 2. The Anglo-Saxon Year after Bede and *Byrhtferð*



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Wallis 1999, Chapter 15):

> *Menses Giuli a conversione solis in auctum diei, quia unus eorum præcedit, alius subsequitur, nomina accipiunt* (The months of Giuli derive their name from the day when the Sun turns back and begins to increase, because one of these months precedes this day and the other follows)... *Eostermonad, qui nunc pascalis mensis interpretur, quondam a dea illorum quae Eostre vocabatur et cui in illo festa celebrabant nomen habuit* (Eostermonath has a name which is now translated "Paschal month", and which was once called after a goddess of theirs named Eostre, in whose honour feasts were celebrated in that month).

The Anglo-Saxon texts provide us with the names of the months, seasons, solstices and equinoxes (see fig 2). These names have survived into modern English as Yule, Lent, Easter, Summer, Midsummer, Harvest, Winter and Midwinter, and are found throughout the Germanic language group (see tables 11 to 13). This broad agreement among the Germanic languages, when compared with the Celtic languages (see table 5), would suggest that a common year is more likely to have existed in the Germanic rather than Celtic speaking parts of Europe. It would also suggest that these Germanic seasons and festivals, like the days of the week, arrived in Britain with the Anglo-Saxon settlers in the 5th century AD.

In 601 AD Pope Gregory the Great advised Augustine, his missionary in England, to rededicate pagan temples to Christian saints and martyrs, and to adopt a step by step approach in the conversion of the English (King 1930, 160-165). This may explain why in England the church borrowed the names for Lent and Easter from the native language, rather than using the Latin names *Quadragesima* and *Pascha* as in the Welsh *Garawys* and *Pasg*.

Conclusions

Ronald Hutton's assessment of the early Irish sources, and his rejection of the 'Celtic Year' as a modern scholastic construction (Hutton 1996, 408-411), is certainly supported by the linguistic evidence. However, his dismissal of the Anglo-Saxon sources appears to be at odds with the evidence. These sources clearly demonstrate that Yule, Lent, Easter, Summer, Midsummer, Harvest, Winter and

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Midwinter all derive from the language of the Anglo-Saxons. Furthermore, these names are found throughout the Germanic language group, in countries such as Sweden and Denmark that have never been inhabited by Celtic language speakers. This would suggest that the major divisions of the English traditional year (the seasons and solstices) are of Anglo-Saxon rather than Celtic origin. These survivals from the Anglo-Saxon year (see table 13) must surely have provided the fabric into which later traditions, such as May Day and Halloween, have been woven. Future research could usefully re-examine received wisdom about the origins of English folk customs, many of which are assumed to have Celtic origins, but are not found in the Celtic regions of Britain or Ireland.

Acknowledgements

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Old English Pronunciation

In Old English of the Anglo-Saxon period the letters *þ* (thorn) and *Þ* (eth) represent the two sounds which are now written *th*, the letters *sc* represent the sound which is now written *sh*, and in the word *Geola* (Yule), the letter *g* represents the sound which is now written *y*.

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Etruscan and Lemnian appear to be twigs of the Pelasgian Branch of the Indo-European Language Tree

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In the light of the recent discovery that the Etruscan language is interpretable when viewed as a Creole language based on Ancient Greek, the notionally related Lemnian language is analyzed from this viewpoint. Despite the paucity of Lemnian inscriptions, and consequently of Lemnian words, a plausible set of translations is obtained. These are presented herewith, complete with their etymological bases and archaeological implications.

Key Words: Etruscan, Lemnian, Pelasgian, Greek languages

Introduction

Among legends concerning the origin of the Etruscans, there is one grouping them originally with the inhabitants of the islands of Lemnos and Imbros into a nation known as Pelasgian (de Simone). Subsequently, so goes the story, some of this nation emigrated to Italy to become the Τυρσενοι or Etruscans, while others remained in Lemnos. Interest in this legendary Etruscan-Lemnian relationship was heightened by the discovery, at Kaminia in Lemnos, of a funerary stele that bore a picture of a warrior, surrounded by an inscription in an archaic Greek alphabet. This alphabet was very similar to that adopted by the Etruscans (Kretschmer). The discovery was made around 1880 (Pauli, 1886), and it occasioned a long and lively debate over the relationship of the language of the inscription to Etruscan (Pallottino).

Transliteration of Text of the Stele

To turn our attention to the text, we must first note that its alphabet is very similar to that of Etruscan. The only differences are: (i) the use of the *o* character in place of the **u** of Etruscan; (ii) the apparent absence of a character denoting *p* with its unaccountable

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The Kaminia Stele

Characters Reproduction of Kaminia Stele

Sound	*Character*	
	Lemnian	*Etruscan*
a	A	A
c		c
e	*E*	*E*
f		*8*
h	◦	◦
i	ı	ı
k	K	K
l	ʃ	L
m	ˈ7	ˈ7
n	ˋ7	ˋ7
o	o	o
p		ʃ
q	↓	Ω
r	P	p
s	S	Ż
t	T	T
u		V
v	*F*	*F*
ch	Ψ	Ψ
z	z	I
th	⊕◦	⊗◦
ph	φ◦	φ

Reproduction of Kaminia Stele

The centerpiece of this stele is the riveting picture of a warrior, armed with a spear. His patrician mien, so calm and confident, is nonetheless menacing to the prospective intruder. There is a triple threat in his gaze, his thick neck befitting a prop forward in rugby football, and his lethal weapon. As noted below, the picture also serves as a kind of pictorial bilingual that conveys the import of the text. The Scottish novelist, John Buchan, visited Lemnos around 1930, and was so impressed by this Lemnian warrior that he made him the hero of a short-story, titled 'The Lemnian'. It relates how his hero voluntarily joined the ranks of the small Spartan force that was defending the pass of Thermopylae, and how he sold his life at the expense of many Persian warriors, impressing even the Persian leader.

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use for *l* , in other words the *l* character has been inverted: (iii) the apparent use of of one of the sibilant characters to denote *z*, which, as is Etruscan, is used interchangeably with *s*; (iv) the use of a different symbol for *q*; and (v) the absence of any symbols for *c* and *f*.

While the sequence of the central text that is wrapped around three side of the picture is easily followed, the three lines of text on the lateral plate demand discussion. Here we find the unusual occurrence of the inner two lines having been written upside-down. It represent an attempt to produce a flattened spiral inscription, because the combinatorially evident line sequence of (1) inner line, (2) outer line, (3) middle line would satisfy this interpretation. In any case, the combinatorial approach solves the problem. Secondly, the characters for *o, q,*and *j* use squares rather than circles. These two anomalies suggest that this part of the inscription was made by a different and less adept scribe. The position of the lateral plate strongly suggests that it was added to the plaque at a later date.

A) Arched Text

holaie. z: naφoθ / ziazi: mara. z: mav
sialxveiz: aviz
evisθo: zeronaiθ / zivai
aker: tavarsiθ. vam.ala.sial:
zeronaimorinail

B) Lateral Plate

holaiezi: φokiasiale: zerozaiθ: evisθo: toverona
zivai:aviz:sialxviz: maraqm: aviz: aomai
rom: haralio:zivai: eptezio: arai: ti(q); φoke

Translation of Text

Any attempt to translate so small a corpus of literature must use every available resource. Fortunately, in addition to the orthodox pair of combinatory and etymological analysis, we have both a pictorial-bilingual avenue afforded by the illustration, and an analogical pathway provided by the existence of copious similar funerary texts in Lydia and Lycia. In both these neighboring countries, the tomb inscriptions begin by naming the tomb, its builder and its inhabitants. In neither case is the age of the deceased given, although some Lydian texts give a date referring to the year of a ruler's reign. In

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both cases, the inscription ends with an injunction against unlawful use, damage, or theft inflicted on the tomb.

In the Lemnian stele, the armed warrior represents both the speaker and the executioner of such a warning. Further, in view of the temporal and geographic location of Lemnos, the etymological approach posits the language to be of Indo-European (IE) type. Accordingly: (i) each line of text is displayed below followed by (ii) a line of notional IE. roots, and (iii) a line giving a literal translation of the word sequence.

Analysis of Arched Text

Text *holaie. z: naφoθ /ziazi: mara. z: mav*
Root uel s nepot / sei merio es ma
Trans.Court this offspring / made the men and women
Text *sialxveiz: aviz / evisθo: zero- naiθ / zivai*
Root siero-kue aue / epi-de su(p)r-nes / seu
Tran.of Siales named / wherein to put up / their dead.
Text *aker: tavar- sιθ. vam. ala .sial:*
Root ak dmbh- sed uen el siero
Tran. Spear tomb put wound injury Sial,
Text *zero- nai - m- ori - nail*
Root su(p)r- nes - m- uers - nes
Tran. above dwelling or beneath dwelling.

A coherent translation of the text would thus read:

> "This tomb precinct was built by the offspring of the men and women of the house named Sial as a place in which to put up their dead. The spear of Sial will painfully wound unlawful intruders, whether they go into the upper or lower levels".

A detailed lexical analysis of the text is now given:

holaie : "court, precinct". IE. uel "assemble"; Hit. *hilas* "court" ; Etr. *helu* " precinct". In its morphology the word more closely matches Hittite *hilas* than Etruscan *helu*, which probably is derived from the Greek 'ηλαια.

z : "the". IE. *es*; Hittite *es*; Lydian *es*. The close match of the article with several languages is little diminished by its enclitic position. This also occurs in Etruscan, albeit with the different particle: *-cn*, as

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in: *sacnicn* "shrine- the".
naφoθ : "offspring". IE. *nepot* "offspring"; Indic *napat* "descendants" ; Etruscan *nefts* "grandson". Both in its morphology and its funerary occurrence, this word cries out to be derived from Indic *napat*, rather than from the Etruscan *nefts*, which carries the restricted meaning of "grandson".
ziazi : "made" . IE. *seu* " beget"; Indic *suh* "progeny". This word has a vowel ending appropriate to a noun, but both positionally and contextually appears to be a verb.

As reconciliation one could postulate a verb with a 2nd person ending, thereby giving a meaning of: "you made". While it is most unusual to find the basic meaning of "beget" applied to the act of constructing a tomb, one is reassured by the appearance of the root as the Sanskrit verb: syati, with the indicated meaning. The alternative choice of respecting the apparent verbal ending of the preceding word naφoθ, and reversing the meanings of the two words would, in any case, not alter the sense of the translation.
mara : "men". IE. *merio* "young man"; Indic *marya* "man". On both combinatory and etymological grounds almost certainly right. Etruscan *maru* "mayor" is used in a special sense as shown.
z : "the". As before.
mav. "women". IE. *ma* "mother" ; Hit. *maya* "woman". Just as correct as the word for "men", and given the same equal billing, as befits kinsfolk of the gyniolatric Etruscans.
sial : "Sial" . This word appears four times in various forms in the inscription, and appears to be the family name of the tomb's owners and occupants.
-xveiz : "persons". IE. *kue* "who"; Etruscan *-xva* "these". This element probably sent the strongest identification signal to earlier translators. And they were right in their conclusion, but wrong in their reasoning, as will be shown below. Etruscan uses the particle as a collective-plural suffix, as in *pulum* "much" / *pulumxva* "amounts". For a suffix denoting "family" it uses *-thuras* as in: *velthina* "Velthina" / *velthinathuras* "of the Velthina family". This Etruscan suffix recalls the Latin *-tura*, as in: *gladiatura* "company of gladiators".
aviz : "named". IE. *aue* "speak"; Greek αυω "call". This word shares with its preceder the blame for misleading earlier scholars (e.g. Brandenstein, Kretschmer), especially when it occurs in

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immediate proximity to it, as it does here. The Etruscan funerary inscriptions, unlike those of Lycia or Lydia, invariably give the age of the deceased and usually use the Etruscan idiosyncratic word numerals rather than numeric characters. Thus we read that the deceased : *avils maxs sealxls lupu* "aged five and twenty died". Again we are rescued by the combinatory discipline, which directs our attention to the occurrence in the lateral text of the phrase: *maraqm aviz aomai* : "and men aviz Aomai", that is to say "of men named Aomai", and clearly not "of men aged Aomai" .

evisθo : " wherein". IE. *epi* " where"; Etruscan *epithi* " wherein". Combinatorially flawless and etymologically most interesting. Etruscan makes liberal use of the locative suffix -thi both for place and time, and it is natural to regard this as a grammatical loan of the Greek suffix -θι, especially as Etruscan is probably a Greek Creole Language.

However, its occurrence as a place-locative in Lemnian suggests that the loan may have proceeded in the other direction, from Etruscan to Greek.

zeronaiθ : "above dwell". IE. *su(p)r - nes* "above dwell" ; Hittite *sara-nai* "above dwell". This compound word appears to be the complement of **zero-zaiθ** " set up" , since it means " dwell above", presumably in the premises so thoughtfully provided.

zivai : " the dead". IE. *seu* : "leave" ; Etruscan *zivas* " the dead". This word for word, meaning for meaning correspondence is the strongest evidence of the close relationship between Etruscan and Lemnian. It is interesting and most familiar that the word, which essentially means "departing", is used euphemistically to mean "dying".

aker : "The spear" . IE. *ak* "sharp" ; Greek ακων "spear". The bilingually pictorial value of the illustration is evident here, because the word begins a new line running the length of the weapon in question.

tavarsiθ · "in the tomb set" . IE. *dmbh - sed* "dig - set"; Greek ταφοςθι "inter". The meaning of this compound word is structurally explicit. Further it raises an interesting etymological issue germane to our examination of the Pelasgian enigma. Georgiev has proposed that the presence of various aspiratively dissimilar word pairs, such as the Greek ταφος " tomb" and θαπτω " bury", may indicate a dual vocabulary, one autochthonously Greek and the other of Pelasgian

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origin. Others, such as Hester, have objected to this invention of another language, and dismissed the findings as indicative merely of loan-words from a Greek neighbor. Not surprisingly for a Greek Creole language, Etruscan also uses both *tafina* to mean "funeral object" and *thapintas* to mean "burying". Since Lemnian uses the equivalent of ταφος, this is the presumptive Pelasgian version of the Indo-European root **dhmbh*.

vam : "wound" . IE. *uen* " wound "; Etruscan *vam* " wound". The meaning here is only too evident in its sound of "wham", although this is more suggestive of a blow from a blunt instrument than a stab from a spear. A short fragmentary Etruscan inscription on a marker stone includes the legend :*.ei thrie vam merta,* "is to make a wound mortal", and the word here is probably not from the Greek βαμος, "step".

ala : " shaft" . IE. aksl "axis" ; Lat. ala " rod". Perhaps, after all, the Lemnian warrior is only threatening a blow from his spear-shaft, the ancient equivalent of a pistol-whipping.

sial: " Sial". As already noted, this appears to be a personal, or rather, a family name, occurring here without prefix or suffix.

zeronai: "above dwelling". As above, but minus the verbal ending **-th**.

-m- : "and / or". Etr. *-m*; Lyd. *-m-* "and" ; Lyc. *me* "and". This conjunctive copula occurs both in Etruscan : *ci tartiria cim cleva* " three tripods and three spits", where it leans on the second item of a conjoined pair; and in Lydian, where it is sandwiched between them just as in our Lemnian example. The Lycian *me* is less relevant because it is free-standing.

orinail : "below dwelling". IE. *uers nail* "slipping down-dwelling". The meaning seems combinatorially sound, but the suggested etymological support is as shaky as its meaning. The troglodytic Lycian tombs customarily were two-story constructions, and their warnings about unlawful use sometimes took the form of a tariff of fees for upstairs or downstairs occupation.

Lateral Plate

Text *holai-e zi: φokiasiale: zero-zaith:evisθo:toverona*
Root **uel - es uoik su(p)r-sed epide dhmbh**
Tran.Court this family Sial erected wherein to bury
Text *zivai:aviz:sialxviz: maraqm: aviz: aomai*

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Root **seue aue sial-kue merio-m aue aomai**
Tran.remains name Sials and men named Aumai,
Text *rom: haralio:zivai: eptezio: arai: ti(q); φoke*
Root **rem gher seue ispta ar tio uoik**
Tran.Rum, Haralio dead their shared this building.

A coherent translation of this text would thus read:

> "This tomb precinct was built by the Siale family, wherein to bury the dead of the name Sials and those men named Aomai, Rom, Haralio, when dead, may share this building."

A detailed lexical analysis of the text now follows below:

holai-: "tomb precinct". As above.
-iezi: "this". As before but bearing the inflectional ending **-i**.
φokia: "house". As above.
sial-e: "of Sial". It is interesting to find this family name (and therefore a noun) being used enclitically as an adjective. Perhaps the inflection denotes a genitive, and represents another example of the Anatolian genitive-adjective described by Bader.
zerozaith : "set above". We have encountered the prefix **zero-** "above" already. Here it is coupled with the verb root **zaiθ** ; IE. *sed,* "set".
evisθo :"wherein". As above.
toverona :"to bury". This appears to be the infinitive of the verb **tover** that we have already encountered in its preterite form in the previous text. The ending **–ona** is equivalent to the Etruscan *-une,* both of which are used as verb infinitive endings.
zivai: "the dead". As above.
aviz: "named" . As above.
zialxviz: "Siales". As above except for **-xviz** instead of **-xveiz,** which again suggests that a different scribe produced this lateral text.
maraqm: "and men". The word **mara** is already familiar, but here it has two enclitics: -q , which may be a plural ending, and -m "and", which we found embedded in the last word of the central text.
aviz: "named" . As above.
aomai: "Aomai" (? PN). Here we are on untrodden ground, and seek the epigraphologists' favorite resort of suggesting this to be a personal name. Lacking any of these in either text until now, this

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seems reasonable. However, since even names have original meanings, we should propose one as well as perusing the catalog of Anatolian personal names. The choice of IE. *au* > Greek αυω "sleep" is at least appropriate to its context.
rom : "Rom" (?PN). Again an unknown. The choice of IE. *rem* > Av. *raman* "rest" is consistent with its preceder.
haralio: "Haralio" (?PN). The last of the trio, in which we face a choice between the inappropriate IE. *guher* > Indic *haras* "warm", and the entirely appropriate IE. *gher* > Indic *harati* "hold".
zivai: "remains". As before, on very familiar ground.
eptezio: " themselves". IE. *ispta*, "self". Again the second scribe uses a more emphatic pronoun.
arai: "share". The most difficult decision of all. Here we suffer a contextual thirst for a verb to drive the clause, and are compelled to find it in a word having the well-established noun ending **-ai**. All we can do is adduce a participial noun bereft of accompaniment by the verb "be". Such an economy of omitting, as understood, the most basic verb is extensively practiced in Etruscan texts. One may presume that this additional arrangement, whereby individuals other than those of the Sial family were permitted to use the tomb, provided the need for this supplementary lateral text.
tiq: "this". Once again a more elaborate pronoun (this time an article).
φoke: "house". As above, but in the literal sense of a building, rather than the metaphorical one of a family.

The Lemnian Language

Lemnian uses essentially the same Greek alphabet as do Etruscan and Lydian. It further resembles Lydian (but not Etruscan) in using the character for **l** anomalously, and the symbol ↓ for **q**, but it eschews the many other Lydian anomalies. It has both aspirates: **ph** and **th**, for which it uses the appropriate Greek characters. Phonologically it has a distinctly Anatolian character, both as to vowels (using only one of the **o/u** pair, but atypically preferring **o** over **u**); and, as to stopped consonants, using only the unvoiced **k** and **t** (but avoiding the issue regarding **p**). It probably derived the aspirated stops: **ph** and **th** from Indic *bh* and *dh*. The text has a complement of diphthongs and glides matching that of archaic

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Etruscan. Syntactically, as far as one can tell with such a small sample, it seems cognate with Anatolian languages such as Hittite. Morphologically, however, it expresses its borderline geographic location in evincing a mixed Anatolian-Indic character. As in both Hittite and Lydian, it uses the particle **-m** as an enclitic copula.

Etruscan-Lemnian Comparison

Etruscan uses with complete orthodoxy (including the correct characters for **l, p,** and **q**) the same Greek alphabet that Lemnian employs with the alterations noted above. Etruscan phonology is similar to Lemnian, but it uses the vowel **u** rather than **o**, and adds the sound **f**, for which it uses the Lydian character *8*. Etruscan syntax is completely anomalous, as would be expected in a Creole language, but, for the same reason, its morphology (apart from absence of **b, d,** and **o**) is Greek orthodox. Its resemblances to Lemnian consist of: (i) same alphabet; (ii)similar phonology (but lacking **o**);and (iii) the three words: *maru* < **mara**; *zivas* < **zivai**, and *vam* < **vam**, plus one special particle:*-xva* < **-xvis**. As the direction of the arrow heads indicates, the Etruscan words are probably inherited from the Lemnian-Pelasgian lexicon, and therefore represent part of the autochthonous core of an otherwise Creole Greek language. Of the Lemnian personal names, **aomai** recalls one of the commonest Etruscan male names, *aule*. The second name, **rom** brings to mind the Etruscan ethnic cognomen, *rumax,* "roman", but is probably unrelated to so remote a person. Lastly, we have **haralio**, which may be related to the word contained in an Etruscan vase legend: *mi marisl harth sian$l l eimi*, "I in the grasp of Maris Sian$ am". The Hittite word *haratar* has a very similar, but more punitive meaning.

New Inscriptions in a New Language

Some time after the Kaminia discovery, a few short fragmentary texts were found in Lemnos (de Simone). These are displayed below.

*1/ arzir 2/ areaz 3/ *pa ol aze*\ 4/ pelerlox ; ho 5/ var θameza*

The first two, *areaz* and *arzir*, appear to be variants of the same word. A very similar word in Etruscan is *ara$*, which may be derived from αιρεω, and means "land holding". Such an interpretation is consistent with the isolated occurrence of the two Lemnian words,

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which may well have served as land markers. A third : *·pa ol aze·* is too fragmentary to be useful. The fourth and fifth, however, are most revealing despite their brevity. The first word in the fourth inscription, *pelerlox* sounds like the oxymoron πελος–λευκος, "dull-bright", and may be a calque signifying fog alternating with flaring. Such a phenomenon would be a frequent phenomenon in the fumarole fields of smoky-fiery Lemnos. The following exclamation, *ho* < 'O! supports this interpretation. The fifth fragment, *varθameza* appears to be another calque, βαρος–δαμα–**za**, in which the Etruscan suffix *-za*, signifying an implement (equivalent to the Greek -ιδιον), is added to a compound word that means " important-master". While this calque does not appear in the Etruscan corpus, Etruscan writers would have produced exactly the same word in order to describe a symbol of authority, such as a *fascis*.

All these short inscriptions appear, therefore to be couched in a Creole language that, just like Etruscan, is of Greek provenance. Indeed, it may be virtually identical with Etruscan.

Historical Inferences

According to Homer, Lemnos was used as a provisioning station by the Achaeans during their campaign against Troy. This would make military sense strategically, since Lemnos would loom on the western flank of any force attacking the Troad peninsula. That Greek occupation of Lemnos appears, however, to have been both benign and temporary, since it would occur about a millennium before the Kaminia inscription was written (around 600 BC.) in a language still free of Greek influence. The new inscriptions must have been written at a later date than that of the Kaminia Stele. Furthermore, they must have followed a complete take-over of the island by Greeks, who then triggered the development of the new Creole language, in which they are written.

The earliest Greek inscription on Lemnos is dated around 450 BC. (Borza), and the new inscriptions in the new Lemnian Creole would have been written around the same time. This inference suggests that the two languages, Etruscan and Lemnian Creole, developed independently, since the Etruscans were settled in Italy by 800 BC.

If we take it as given that the Trojans were displaced by the Achaeans around 1500 BC. , and that they eventually became the

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Etruscans, we must look into the time window that extends from that date to around 800 BC. Such a search would certainly bring Lydia under scrutiny, in view of the legend, related by Herodotus, that the two nations, Lydia and Τυρσενοι, were originally one.

Then, that, due to a famine, the latter emigrated to Italy to become the Etruscans (Ridgeway). In a future paper, I hope to address this intriguing story.

Conclusions

Part of such an exercise in linguistic archaeology would entail identification of the particular Greek dialect involved, but that falls outside our present field of reference. What is compellingly relevant is the origin of the autoch- thonous core of the Etruscan language. This comparison of Lemnian with Etruscan has produced suggestive evidence that they come from the same Pelasgian source. Furthermore, the etymological analysis of the Lemnian text has shown Pelasgian to be a twig of the Anatolian-Indic branch of the Indo-European family. This conclusion is close to that of Adrados, who saw Etruscan as an Indo-European Anatolian language, albeit not closely related to Hittite.

At last, Etruscan may claim its rightful place, so long and adamantly denied by the authorities, in the great Indo-European clan. Better still, it can claim it on two counts: one as a natural child, the other as an adopted one.

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Family, Kin and City-State

Numa Denis Fustel de Coulanges

Edited and Abridged by J. Jamieson

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When Institutions Fail: Can Viable Social Policies then be Formulated?[1]

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This paper examines evidence that egalitarian social scientists, by denying the interaction of biological and environmental factors, have generated and continue to generate a series of counterproductive educational "reforms." Focus is placed on forced busing, as shaped by policymakers who emphasized environmental and ignored biophysical factors and naively concluded that massive transportation of students away from their neighborhood schools would produce meaningful educational benefits. But busing is no longer an issue; the egg is broken, the damage done.

Key Words: School busing, school grades, education, intelligence, racial integration, egalitarian ideologies

Introduction

Given widespread admission that busing has proven counterproductive, it might be assumed that the lesson has been learned, will not be repeated, and authentically productive schooling policies will now be forged. Regrettably this is not the case: key individuals working within institutions responsible for past busing miscalculations – courts, media, government agencies, churches, universities, and professional organizations – haven't remorsely paused to appraise the harm busing has imposed on students, families, the schooling enterprise and indeed society in general. Instead, they plan still more ambitious and equally detrimental schooling innovations based on assumptions which ignore the impact of biology and parental responsibilities in the development of human

[1] For a more comprehensive assessment of institutional breakdowns in American life, see *How We Got There* by David Frum (Basic Books: New York, 1999) as reviewed by Frank Gannon in the *Wall Street Journal* (January 27, 2000). Frum examines how such fundamental institutions as schools, courts, churches and government have not infrequently harmed society. Consequently, says Frum, Americans suffer a sufficiently enormous loss of faith in institutions as to be revolutionary.

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abilities. The power and ideology of egalitarians, and the institutions they control, must be reassessed and diluted if authentically beneficial interventions for significant sensitive social and educational issues and programs are to be implemented.

Within the limits of a single paper and for the purpose of illustrating the counterproductivity of institutional breakdowns on quality education, I first present an overview of the impact of forced busing, and how the egalitarian rationale of forced busing conflicts with established knowledge concerning dynamics of human development. I then review how institutional forces uncritically, and often with the best of intentions, embraced busing as a quick fix for dealing with persisting, and often ethnic related, educational inequities.[2] This is followed by a discussion of current and pending schooling and societal reforms, based on the same ideological prejudices which created busing, which if implemented will continue to inflict harm on students, families, and communities while further eroding public confidence in our basic institutions. Next, I review some of my personal experiences, which illustrate certain reasons why past and current researchers are discouraged from objectively assessing sensitive educational and social issues. Finally I examine evidence that – unless an aroused public acts – societal policies will continue to be shaped by ideologies which disregard science, civility, and the rules upon which a viable and truly democratic society survives.(1)

A Failed Experiment

Busing represents a major juncture in American life and reveals the cost to society when basic institutions implement policies which naively follow a "moralistic" or politically expedient course and disregard scientific knowledge. In retrospect it is lucidly clear that busing was launched over 40 years ago with the fervor of a crusade; social justice and educational quality were presumably at stake as

[2] Throughout the paper, references to minority students refer to Blacks, or African-Americans. However and although busing was ostensibly initiated for African-Americans, educational issues discussed here also affect educational experiences of Whites as well as non-Black minorities.

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busloads of children were transported – often over objections of parents and especially African-American parents.[2] But now the rationale of busing lies in shambles; busing is acknowledged as an incredibly simplistic response to complex schooling issues, whose institutional support reveals that historic societal bulwarks suffer such profound inability to deal with sensitive social and racial issues as to render them incapable of responsibly meeting their historic obligations.

The cost of busing in human and economic terms is incalculable. When first initiated, *total* busing costs were estimated at $2 billion; this is the cost of busing in Kansas City *alone* through 1999; official reports describe the consequences of Kansas City busing as "dismal."[3] No current figures exist on the nationwide costs of busing which are *minimally* estimated in the hundreds of billions of dollars.

As Robert Coles and others have documented, human costs of busing far exceed financial outlays.[4] Few social scientists doubt that African-Americans have paid the highest price for busing, as witnessed by disturbing events across the country as well as demographic trends, for which busing is at least partially responsible. Thus and while pre-1960 data are difficult to secure, the African-American illegitimacy rate approximated 10% at the onset of busing but has more than tripled and in 1997 stand at 69.1%.[5] Moreover and although busing is but one major variable in the declining quality of American life, that decline chronologically coincides with the onset of busing. Pre- and post-busing ethnic data regarding crime, drug usage, family breakdowns, and standard achievement scores attest to the deteriorating quality of life within American neighborhoods following destruction of neighborhood schools.[6]

Given the extent to which millions of parents of all races opposed and continue to oppose busing, coupled with evidence that the practice has detrimentally impacted on students, families, schools, neighborhoods, and communities, one might expect institutional leaders to openly acknowledge their errors and remorsely abandon naive environmental "reforms" such as busing. Not so. The failure of busing has been dropped into Orwell's "memory hole"[7]; those responsible for busing have conveniently forgotten their embarrassing credulity concerning the presumed value of indiscriminately

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transporting thousands of children and determining school assignments on the sole basis of race. Instead, reformers now propose more ambitious, tendentious, harmful and expensive innovations than those which have already failed. Recently the Federal government acknowledged that its five year and $29 million dollar study, concluded in 1997, failed to secure any evidence whatsoever that $46 billion dollars spent to help poor children did, in any significant way, improve academic achievement or emotional stability.[8] The report doesn't even consider evidence that the failure of widely praised schooling proposals is linked to timeworn and unsuccessful policies which focus on what occurs *within* classrooms and ignores broader social and biophysical dynamics.

Despite evidence that most of what students learn depends upon biological and family conditions, policy makers continue to emphasize the fundamental premise which led to busing: interventions *within schools* can significantly narrow the African-American and White achievement gap.[9] In early 2000, and speaking in Little Rock, Arkansas, site of a major school busing battle 50 years ago, George W. Bush noted the Black-White achievement gap and declared ". . . whatever the cause, the effect is discrimination." Bush proceeded to advance schooling proposals which are demonstrably nonhelpful and fail to address biological conditions as well as the need for parents of all races to shoulder more responsibility for how their children behave and learn.[10]

Scientific studies persuasively document the role of biological and biophysical factors to lifelong learning trends.[11] Maternal smoking during pregnancy increases the likelihood that a child will present behavioral problems. In a study funded by the National Institute of Drug Abuse (NIDA) more than four times as many two year olds of mothers who smoked during pregnancy showed high rates of risk taking, impulsivity and rebelliousness than did two year olds of nonsmoking mothers. This study controlled for such sociological factors as a mother's personality, stress, and income level. The NIDA researchers hypothesized that smoking alters children's behavior by exposing the fetus to nicotine, which reduces the extent to which oxygen reaches the brain.

Given evidence that parents share responsibility for children's adjustments and that biological factors significantly shape behavior,

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educators must *ultimately* face a fundamental fact: even during the prenatal months, children's learning abilities may be forever enhanced or impaired by laws of inheritance and by parental behaviors.[12] Thus if, for example, more African-American than White mothers smoke or abuse drugs, that alone would explain some ethnic learning differences.

Virtually all medical schools now teach that the human brain develops most rapidly during the prenatal and perinatal stages. During these critical periods, and responding partly to genetic and family proclivities, nature opens or closes windows of learning. As the child matures, specific windows of learning may remain open or be shuttered. For some children, windows are slammed shut even before birth: thus maternal alcohol abuse during pregnancy may literally kill millions of brain cells in unborn babies, therapy for cocaine babies has proven unhelpful, and children of low birth weight present high educational risks.

The salient role of prenatal and perinatal life to longitudinal learning and behavioral styles leads directly into ethnic-related issues such as forced busing, one of many educational reforms bases on spurious assumptions. Without passing moral judgment, an unpleasant fact must be acknowledged and ethnic learning differences seen the context of early abuses to which children are exposed. These abuses partially explain the stubborn ethnic aptitude and achievement gap which is virtually unchanged, at one standard deviation, from the preschool years through adulthood and which to some extent are associated with ethnically disproportionate child raising practices.[13][3]

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[3] Given the sensitivity of the issues discussed here, it is important to note that considerable ethnic overlap exists on virtually all group tests of achievement or intelligence: group differences do not address the status of individuals. Further, when reference is made to group IQ differentials, egalitarians frequently employ inflammatory language, such as relying on the canard that any reference to racial ability differences assumes "racial inferiority." Statistics consistently indicate that Black-White group scores on aptitude and achievement measures are significantly discrepant, typically by one standard deviation. To deny significant *group* race differences on standardized tests is to preclude appropriate early intervention. As one example, in the early 1970's my colleagues and I developed an early learning readiness test. Troubled by ethnic social differences, as reported in the test manual, a school administrator called me. He wanted to order the test but only if it were "fair", which required equity of Black-White scores. Upon learning that any such revision

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Therefore ethnic learning differences involving large numbers of individuals cannot be significantly negated by educational interventions which schools presently implement.

Many educators are unable to accept an admittedly unpleasant fact: for large numbers of children, windows critical to effective learning are already closed by the time they enter kindergarten. Therefore, irrespective of how much money schools expend, some children will not acquire average academic skills. In practice this does not mean that children are forever "hard wired": environmental enrichment can combine with genetic proclivities to keep certain windows of opportunity open. And yet the harsh world of reality requires that teachers be concerned with events which have occurred, and occur, beyond the classroom. It also demonstrates the need for teachers to acquire sensitivity about human differences, as well as skills to create realistic matches of children's patterns of abilities and curricular strategies.

Contrary to traditional educational views, educators are often more effective if they formulate lower expectations for some children to help them avert a sense of learned helpfulness and disengagement from learning; the converse also holds: some experienced children will disconnect from learning when not challenged with advanced instructional levels. Especially during the current era which focuses on multiculturalism, this concept of individual differences is often summarily rejected. Recently an administrator of the St. Louis schools lectured to the students at the university where I work. His central message: he goes into inner city school classes and urges all student to believe they can become doctors. Inasmuch as the average African-American high school graduate functions approximately three years below his White counterpart in most academic areas,[14] such advice is cruel. Encouraging students to reach high goals is commendable, but there is the other side of the coin: unrealistic goals can lead to disillusionment, to learned helplessness and, all too often, to adult unemployment.

Educational perceptions which emphasize biological and parental considerations, and therefore the interplay of biological and

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of test norms was impossible, he elected not to purchase the test.

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environmental forces, are virtually ignored in university training of teachers. Instead, future teachers are typically instilled with the egalitarian belief which proclaims the similarity of student needs, the injustice of imposing higher academic demands on only some students, and the virtual uselessness of developmental histories, standardized achievement and IQ tests, ability grouping and a comprehensive understanding of what individual students can do *before* formulating curricular strategies.

Before examining current and projected egalitarian schooling reforms, it is instructive to examine how societal institutions malfunctioned when confronted with busing, which is but one of the various sensitive topics now confronting American society and its institutions.

The Brown Decision: When Justice Blinked

In 1954 and in *Brown vs Board of Education*, the U.S. Supreme Court legitimized busing. During the *Brown* proceedings, busing proponents could have focused on *de jure* desegregation, or the constitutional rights of children to attend neighborhood schools irrespective of race. Instead they advanced a more ambitious agenda and mandated *de facto* desegregation. A new dogma was created; Black children could only gain quality education if schools were racially balanced, irrespective of biophysical and family background factors. In numerous communities *de facto* desegregation destroyed the natural fabric of home, school, and community: schools were required to maintain mandated ethnic quotas. Not surprisingly more affluent parents fled the public schools which increasingly serve the less economically advantaged.[4]

Given that *Brown* dramatically changed the lives of millions of Americans, it is astonishing that High Court proceedings were devoid of informed debate concerning anticipated busing effects. Absence of constructive dialogue drew the attention of Justice Felix Frankfurter, who asked Thurgood Marshall, Chief NAACP Counsel,

[4] The alleged value of forced busing can be estimated by noting the number of Federal and State officials, as well as judges, who permitted their children to be bused to schools distant from home.

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why NAACP claims of desegregation benefits were not been challenged by defense experts. Marshall replied that no social scientists in the country would contest NAACP positions(15). At the same time Marshall knew that some of the nation's most prestigious social scientists concluded that busing would prove harmful but feared saying so publicly, to avoid being called "racist."[5] Further, Marshall urged NAACP experts to fudge facts and "get by those boys (Supreme Courts justices) down there ."(16) To "get by those boys," Kenneth Clark, lead NAACP expert, compiled a list of 35 social scientists concerning the effects of desegregation. In his egalitarian-based review of busing in America, Kluger approvingly notes that Clark and his colleagues "presented a small piece of duplicity."(17) The list of scientists nonetheless impressed the High Court, was in large part incorporated into the famous Footnote 11 of the *Brown* ruling, and contains conclusions which are now acknowledged to constitute quackery.

With little effort, the Justices could have discerned why there was no meaningful debate concerning the educational and environmental impact of busing: the issue had been moralized into "good and evil."[6] Nobel Laureate Gunner Myrdal, often cited in

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[5] In the tortured American struggle to assure justice for all, the terms "racism" and "racist" have not only created obstacles to constructive dialogue but have taken quite different forms over time, and illustrate just how far we have come in reaching our ideals and how far we have yet to go. Although Abraham Lincoln has often been honored as "the Great Emancipator," on August 14, 1962 he informed a deputation of African-Americans that he favored plans to return them to Africa. Said Lincoln: "You and we are different races. We have between us broader difference than exists between almost any two races . . . this (difference) is a great disadvantage to us both as I think your race suffers very greatly, many of them by living among us, whiles ours suffer from your presence. In a word we suffer on each side . . . The aspiration of men is to enjoy equality with the best when free, but on this broad continent, not a single man of your race is made the equal of a single man of ours. Go where you are treated best, and the ban is still upon you." [Basler, R.P. (Ed) *The Collected Works of Abraham Lincoln*. Rutgers University Press: New Brunswick; 1953, 370-375.]

[6] In retrospect, this issue of desegregatory "evil" is quite complex. During the *Brown* proceedings, and as Marshall publicly portrayed busing as a moral imperative and a struggle against racism, his actions spoke differently. While encouraging one of his experts to falsely testify, Marshall declared " . . .when we niggers take over power, every time a White man breathes he's going to have to pay a fine." Equally troubling is the widespread knowledge of NAACP staff members that Marshall was hostile to Whites *(Kluger, Op. Cit, p 324)*.

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Brown, had stated ". . .it is now becoming difficult for even popular writers to express other views than the ones of racial egalitarianism, and still retain respect."[18] This is precisely what defense attorneys discovered: some of the nation's most influential researchers refused to testify for fear it would risk their careers.[19] Julian Stanley, President of the Division of Educational Psychology of the American Psychological Association (APA), noted that most measurement specialists feared speaking out as busing facts were twisted, while those who did speak up were likely to be labeled racists or at least liberal."[20] As the busing controversy intensified, some of the few scholars who questioned the value of busing abruptly altered their data and opinions to conform to political correctness; those who did not were castigated.[21]

Formal Court actions further restricted open discourse. Defense attorneys were given short shrift as the High Court moved toward reaching a "just" decision regardless of constitutional law, precedence, or responsible social science.[22] Social scientists were never cross examined when, under oath, they provided testimony which is now acknowledge to be incredulous. Consider a few examples of slipshod social science: the Justices were persuaded that the intelligence of Blacks significantly increased if they lived in the "Superior Northern environment," and that Black-White achievement scores would equate after a few years of desegregation.[23] Today even egalitarians consider such claims ludicrous.

Eventually the High Court concluded that racial imbalance inflicted lasting cognitive and emotional harm on Black children. This finding led to numerous embarrassing and simplistic lower court rulings. Just a few examples: Yielding to "expert" testimony, Judge George Carr ruled that after four years of desegregation, which permitted Blacks "equal educational opportunity," literacy tests would no longer be discriminatory.[24] In another ruling, Judge Julius Chambers declared that all social scientists agreed that busing would significantly enhance Black learning profiles.[25] Judicial ignorance of basic educational facts in indeed mindboggling. Almost two decades after the *Brown* ruling, and in *Swann*, the district court judge was shocked to learn what every informed educator realized – as a group, Blacks performed academically at a far lower level then did Whites; relying on "expert opinions," the judge concluded that a "dramatic

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improvement" in Black performance could be produced by putting Blacks in schools with a majority White student body.[26]

Having heard only one perspective on complex desegregation issues, the High Court validated flimsy and deliberately fabricated "research."[27] Truth became increasingly obscure, lost in inflammatory rhetoric which alerted researchers to the professional hazards of being honest. Long after the *Brown* ruling, researchers continued to be punished for honestly disputing egalitarian myths. Following publication of the Coleman Report in the late 1960's, which contradicted basic findings of the *Brown* ruling, and is now recognized as one of the earliest objective investigators into busing effects, Nathaniel R. Jones, NAACP General Counsel prior to being elected judge to the Sixth Circuit Court of Appeals, stated "Dr. James Coleman (major author of the Coleman Report) is a fraud . . . thoroughly repudiated by colleagues.

Only decades after *Brown* did the public learn the extent of "expert" deception that marked the trial. Aware that the impact of school factors could not be linked to racial academic differences, Kenneth Clark had nonetheless testified that not only school desegregation but also racial imbalance in schools was both emotionally and educationally damaging.[28] Lauded by a Supreme Court justice as "the voice of American social science," Clark had in fact informed NAACP attorneys during the *Brown* proceedings that he had no evidence of segregatory educational harm. Nonetheless, and at the urging of Marshall and others, Clark testified that busing was harmful; he continued to report misleading "expert opinion" in post-*Brown* litigation and thus perpetuated the myth that busing fostered Black learning and self esteem. Even more troubling was Supreme Court Justice Earl Warren's admission that he recognized the fallaciousness of expert opinions presented during *Brown*, but could only gain unanimous High Court approval by publicly using the bully pulpit of the Supreme Court in proclaiming as unchallengeable truth the very testimony he recognized as fraudulent.[29]

Institutional breakdowns continued as neighborhood schools were methodically transformed from educational institutions into centers for social change. Across the nation, lower court judges ignored Congressional insistence that busing assured Black children the right to attend their neighborhood school but did *not* legitimize

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enforcement of racial balance in schools. Within government bureaucracies, laws were replaced by egalitarian prejudices. More than a few government lawyers refused to do the work for which they were paid. On one occasion alone, 107 lawyers from the Civil Rights Division signed letters protesting former President Nixon's request for legislation to limit the power of federal courts to order busing.[30] Washington insiders acknowledged that the Justice Department sometimes had difficulty persuading its own lawyers to adequately prepare government cases designed to limit busing. The relatively few government cases opposing busing were poorly handled, as if to assure losing cases and perpetuate busing, despite the anti-busing mandate Nixon had received from the public.

Congressional and legislative actions were swept aside: children were assigned to schools on the basis of ethnic head counts: some children attended different schools annually, to assure "ethnic balance." Recognizing that such infringement on rights of local communities and parents required an educational basis, U.S. government agencies sought to sustain busing support by claiming astonishing educational benefits and relegating factual assessments of busing effects to obscurity. Misinformation as busing effects was sufficiently widespread to confuse even the well informed. After finally studying the "Coleman Report," Robert Nichols, writing in *Science* magazine, remarked "the findings (of the Coleman Report) are too astonishing to be accepted." Suddenly the Coleman Report went of print and became unavailable. The U.S. Department of Health, Education and Welfare published a 346 page report which detailed comprehensive control over "proper research" and mandated pro-busing filters on research.[31] Other State and Federal agencies followed suit and solicited grant proposals from pro-busing researchers, whose conclusions could be predicted, and whose findings now not only discredit America's social science but raise questions of malpractice. University researchers got the word and either muted criticism of busing or reported imaginary benefits.[32] Here and there the Federal bureaucracy slipped; some researchers reported actual facts. This was quickly rectified, reports rewritten, the public was assured that busing produced benefits, and names of dissident researchers were stricken from lists of persons eligible to conduct Federally supported busing research. Dr. James V. Mitchell,

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Associate Dean for Graduate Studies at the University of Rochester, was asked to evaluate a busing program: specifically instructed to determine whether Blacks benefitted from busing, Mitchell concluded that bused Blacks experienced extensive social and emotional problems that might intensify racial tensions.[33] Without Mitchell's knowledge, the official report was rewritten to state that the bused children "seem to be making an excellent adjustment." Meanwhile, an official of the State Department of Public Instruction accused Mitchell of "reprehensibly separating statistical analysis of black and white children in the study," although this was Mitchell's explicit charge. For Mitchell, there was more to come. He submitted an article for publication in a scholarly journal and for the first time in his professional career he received a rejection note; his paper contained unspecified "research flaws" and "could easily be misunderstood."

Political pressures muzzled those government officials and researchers who sought to focus on facts, and thus was perpetuated the myth of busing-related academic increments. Despite ongoing media distortions, by the 1980's many Americans couldn't reconcile the promises and the realities of busing. After considerable internal disputes, the General Account Office (GAO), an independent organization headed by the Comptroller General which reports directly to Congress, announced that it would assess the impact of school desegregation on African-American learning profiles. The announcement created a furor in government offices. Yielding to political pressure GAO, heralded as the "watchdog of Congress," aborted the study.[34]

As the failure of busing became increasingly apparent, pressure mounted for educational leaders and researchers to either perpetuate falsehoods or to avoid reporting busing truths. Here and there an occasional voice arose to question the value of busing. The few dissidents drew criticism from Kenneth Clark, who urged that they "be monitored with vigor and with Stalinist intensity."[35] Clark, the "voice of American social science," went further than suppressing free academic dialogue. He charged researchers who questioned the value of busing with misleading the public and thus violating the "trust essential" in the ongoing struggle for scientific truth. To meet this presumed threat to "truth," Clark had an answer: researchers

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questioning the value of busing and other politically incorrect ideas should be subjected to "psychotechnology," a combination of drugs and electrical stimulation of certain brain areas.[36] Given such treatments, the brains of all researchers presumably would be wired to assure unanimous support of social objectives consistent with Clark's version of truth. APA publications approvingly published letters supporting implementation of psychotechnology for erring educational researchers.

Egalitarian pleas for censorship received succourance from the media, academia, professional organizations, bureaucrats, and churches; university researchers recognized that uncritical support of busing offered rewards and in some cases survival in the academic climate of "publish or perish." Prestigious journals, whose editorial decisions could determine whether a professor received tenure or promotion, moralized the busing issue and thus closed debate over the most important schooling issue of the century. The influential educational journal *Phi Delta Kappan (PDK)* endorsed a manifesto which urged punishment of public school teachers who opposed busing.[37] It also approvingly published an article which proposed that educators take the following pledge: "I, a teacher, am sworn to total ethnic integration," and equated opposition to busing as bigotry and racism. The manifesto also declared that an "overt expression of prejudice" suffices for the removal of a guilty teacher from his profession and that such practices as ability grouping and standard testing are "inhumane." At that point in time, all public statements opposing forced busing were not uncommonly viewed as "racist" or "an overt expression of prejudice." Consistent with the editorial position of the *PDK*, the National Education Association (NEA) published a brochure which not only uncritically endorsed busing but charged that white educators are part of "the national racist problem."[38]. Other periodicals, including the *Harvard Educational Review*, published strident articles which asserted that schools alone can help children: the message was clear: responsibilities for academic achievement lie not with biophysical or family factors, but with such school-based interventions as forced busing.[39]

Influential media centers interpreted busing as a moral crusade, and misled readers. *Time Magazine* published a feature article which claimed that "many studies indicate that Blacks make substantial if

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spectacular academic progress in integrated schools."[40] Puzzled at these astonishing claims, I contacted the research director of each of the schools cited in *Time*. Not a single official supported the claim that busing enhanced Black achievement. Some officials denied responsibility for reporting nonexistent academic gains in their districts and shifted blame for false reports to inaccurate media releases, attributable to government officials who literally demanded optimistic reports if Federal funding was to be continued for the schools in question.

Media releases aimed for the general public also moralized the busing issue. President Nixon and Presidential Candidate Henry Jackson were faulted for not vigorously endorsing massive busing, which media sources claimed did indeed raise African-American achievement levels[41]. Nationally, media leaders agreed not to report busing-created problems. Consider just a sampling of media censorship in the city, Boston, where an ad for a book which questioned the value of busing was erroneously published. Said Charles Whipple, who served as censor of the *Boston Globe*, "This one slipped by. I'm going to recommend the *Globe* set up a procedure to prevent this kind of thing. That ad should never have been printed here. This is an extremely volatile situation."[42] Further, the media virtually ignored results of a Boston referendum which rejected busing by 13 to 1.

American churches, as a rule, perceived busing as a moral issue and were drawn into a controversy over which they had little empirical knowledge. Although unfamiliar with the complexities of busing and of human learning, several church bodies passed resolutions on school busing.[43] A review of newspaper articles from 1960 through the mid 1990's reveals intense efforts of Catholic, Jewish, and Protestant leaders to portray busing as a vehicle for enhancing Black achievement and racial equity, and a cause which was wholly in harmony with religious tenets. More than once, while attending Catholic or Protestant church services, and known as a doubter of busing benefits, I uncomfortably shifted weight and winced as sermons depicted opposition to forced busing as "non Christian" and uncharitable. On one occasion a church elder admonished me for having testified about the harmfulness of busing, and loudly and angrily - - -unaware that her comments could be construed as racial

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– proclaimed that "Blacks are God's *children*."

Pursing Egalitarianism: The ongoing pursuit of counterproductive "remedies"

Having "won" the busing battle, egalitarians now press for still more questionable reforms and blame teachers and society for documented and persisting academic racial differences.(44) Schools lose accreditation and teachers are denied merit pay if students do not effectively learn. But if biological windows of learning have been closed because of biological or family dynamics, or if children watch television until 3 am and come to school bleary-eyed, what can schools or teachers actually accomplish? Teachers do have an option: they can quit the teaching profession and many of the nation's best are opting to do just that.

Despite evidence that learning is a complex matrix of biological and environmental variables, nationwide efforts are underway to homogenize schooling curriculum and to place "high" academic demands on all students, regardless of the vast spectrum of human abilities. At City College of New York, the U.S. Office of Civil Rights is entangled in legal action because disproportionately high number of minority college students have been assigned to remedial classes.(45) [7] Civil rights advocates insist on higher minority admissions to academically demanding college courses and programs. They do not dispute evidence that ethnic group academic disparities exist on the basis of standardized tests, that Black high school graduates generally score at approximately the ninth grade level, and that placement of low-scoring students in demanding courses fosters academic failure unless teachers adopt a curricular "dumbing down."(46)

Disregarding questions of ability and motivation, universities and colleges are imposing demands on professors to establish racial quotas on graduation and retention rates. In early 2000, the Iowa Board of Regents established a policy that each of the state universities should retain and graduate minority students at the same

[7] Conversely, the New York Civil Liberties Union has brought suit in an Appeals Court, arguing that minority students receive insufficient remedial instruction.

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percentage rate as White students. University of Iowa President, Sue Coleman, remarked "I think we have got to have the same for everyone."[47] Consequently, professors are monitored and subject to disciplinary actions if they assign ethnically disproportionate grades. When news of the effort to implement racial quotas in grades, I was approached by an African-American student in my class who had *earned* an "A." He angrily denounced grade quotas as an affront to all African-Americans.

Focusing on persisting minority underachievement, officials in various states have imposed pressure on schools to increase minority learning levels.[48] Nothing is said about *causes* of lower African-American group learning levels. Further, to deal with nationwide lower African-American achievement profiles, the College Board, which sponsors the *SAT* as well as other college and high school tests, created a 31 member task force. Edmund W. Gordon, a Yale University psychologist and author, co-chaired the panel. The group proposed various egalitarian reforms to close the minority-majority achievement gap. Not a single proposal dealt with biological factors or parental responsibilities. Gordon's selection as panel co-chair illustrates the politicization of American educational centers of power. An early proponent of busing who now acknowledges that the practice has proven harmful to Blacks, and who previously reported academic benefits of compensatory programs which have proven illusionary, Gordon is not humbled by his successive errors in charting schooling reforms and misinterprets research-based findings of the 1966 Coleman Report, discusses *The Bell Curve* as scholarship "not up to standard," and questions researchers cited in *The Bell Curve* not on the validity of reported findings, but solely on the basis of the *source* of research findings.[49]

Other contemporary and influential task forces are directed by individuals who have for decades virtually ignored the role of biology and parental responsibilities as they promoted busing. Thus Gary Orfield, who now acknowledges that contrary to his earlier predictions desegregation is no longer possible in major school districts, led the 1993 National School Board Study. Predictably, the Study proposed a series of fresh egalitarian reforms. Moreover, Orfield continues to head the Harvard Project on School Desegregation (HPSD) which supports ongoing busing while

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acknowledging, however, indirectly, the absence of demonstrable benefits.[50]

On another front, the U.S. Department of Education (USDE) has taken steps which would effectively ban – through threat of lawsuits and loss of federal funds – the use of any admissions test that has a 'disparate' impact on minorities.[51] Here again the voice of Black parents is not heard: most Black parents favor standardized tests.[52] Inasmuch as all standardized aptitude and achievement tests show "disparate" ethnic patterns, some university officials have expressed fear of lawsuits unless they admit all applicants, regardless of academic skills. In an effort to salvage the *SAT* and as the gap between African-Americans and Whites has widened, the College Board which sponsors the *SAT* now awards extra points to prospective minority students if they are "strivers."

Establishing social quotas on suspensions and special class placements

USDE officials have issued edicts to assure (presumed) behavioral and special class equity. In Waterloo, Iowa, which in 1992 reported a 22 percent African-American population, 40.8 percent of the suspensions involved African-Americans. Citing the disparity, USDE official Sofia Muhammad warned that Federal funds will be withdrawn from the school district if suspension disparities persist.[53] To secure ongoing Federal funding, the Waterloo, Iowa school district has taken steps to identify teachers and principals responsible for high minority disciplinary referrals, and provide them with in-service: other corrective steps include expanding human relations activities and hiring more police officers. Not a single proposal addresses parental responsibilities or biological considerations. No effort is made to examine evidence that adult Black males present a higher incidence of crime, and it may therefore be therapeutic if high school Blacks are given "color blind" discipline which may enable them to avert more serious problems when, as adults, they will be accountable to the law.

Racially unbalanced special education classes also face Federal and State charges of bigotry. The U.S. Office of Civil Rights (USOCR), strengthened by support by academic leaders and editors of professional journals, monitors ethnic percentages in classes for

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students identified as "at risk," gifted, learning disabled, emotionally disturbed; other "civil rights" groups have followed suit.[54] Echoing USOCR allegations, the lead article in an official publication of the American Educational Research Association (AERA) claims that "institutional racism" explains the disproportionate number of minority students labeled "at-risk," learning disabled or "emotionally disturbed." Such practices, the author states, are manifestations of the "oppressive nature of whiteness."[55]

To assure ethnic balance in special education classes, it is often necessary to destroy the basis for which special classes were originally formulated. For example, African-American youth suffer a high incidence of delinquency.[56] Is it therefore desirable to deny special services to a predelinquent Black youth because of race and to provide such services to a less troubled White student? The reverse occurs in classes for the gifted, where African-Americans have been historically underrepresented. Egalitarians insist on gifted placement of some African-Americans who can only fail in such demanding classes. Moreover, if some Black students do not succeed when assigned advanced classes in which teachers do not compromise standards, teachers are held responsible.

Mainstreaming or Inclusion

Once busing had been implemented, it became apparent that racial balancing of schools was insufficient: classrooms remained imbalanced, inasmuch as ability grouping caused "segregation within schools": disproportionately higher numbers of White students were in the higher ability classes, whereas the reverse occurred in less advanced classes. To correct this imbalance, egalitarians have promoted and in many schools implemented a reform which may prove even more harmful then busing: mainstreaming or inclusion. This "reform" requires placement of all students in the same classroom, regardless of learning profiles and abilities. I came to comprehend the meaning of mainstreaming while teaching inner city tenth grade classes. Mainstreaming or untracking, required me to give the same instruction to students whose reading skills range from fourth grade through the first year of college.

Recent investigations have revealed that major schooling reforms are designed not to match students with attainable objectives but to

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accomplish a social good – closing the academic gap of ethnic and social class groups, even if such reforms require downscaling education standards. Little wonder, then, that several extensive investigations have revealed that students from high and middle class homes suffer academically if they attend mainstreaming classes which scale back academic demands to accommodate less advantaged students.[57]

Troubled by the "dumbing down" which inclusion typically requires, affluent parents on both East and West coasts have gone to court and succeeded in lifting the U.S. Office of Civil Rights ban ability on grouping.[58] Few parents can afford that option; less wealthy parents must be content to see their children receive an inferior education.

Attacks on Standardized Testing

Group achievement and IQ scores of Blacks have been approximately a standard deviation behind those of Whites as long as schools have employed standardized testing: nonetheless, "experts" assured the nation that busing would narrow the Black-White test score gap. When, after decades of busing, racial differences of a standard deviation persisted, egalitarians shifted tack and argued that standardized tests should be discontinued inasmuch as they simply reflected social inequalities. Media attacks on testing began as the failure of busing became increasingly apparent: in 1972, Dan Rather of CBS anchored a feature entitled "The IQ Myth"; other media powerhouses followed suit and the drumbeat of distortion persists.

In an effort to secure "justice" educational policies have lost their moorings. Encouraged by invalidated and ideologically driven anti-IQ bias, in the early 1970's, a group of Black parents sued the San Francisco schools because IQ test scores were employed to place their children in special classes. Test bias was alleged and IQ testing of Blacks was banned throughout California. Subsequently other Black parents filed suit, alleging that their children were being denied equity because the Whites but not Blacks could not be given IQ tests; to resolve the matter, IQ testing was eventually outlawed for all California students.[59]

Despite actions in California, school psychologists in most states continued to use IQ tests which had demonstrated not only reliability

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but also construct, content, concurrent, and predictive validity. As recently as 1999 a poll of practicing school psychologists reported that IQ assessment was the single most highly valued psychological tool employed in framing appropriate interventions for vulnerable students.[60] But attacks on IQ persist. In response to charges that IQ scores are the "enemy" of poor and minority students, entire psychology training programs either omit or minimize IQ testing to the point where prospective psychologists fail to acquire adequate administrative, scoring, and interpretive skills to secure valid scores.

As IQ competencies become increasingly disparaged and even discarded in graduate training programs, procedures to help vulnerable learners increasingly depend on what transpires solely *within* schools; reasons *why* a student experiences a learning problem are seldom examined: this trend is apparent in the recent conventions of such organizations as the National Association of School Psychologists (NASP), the American Psychology Association (APA), and the AERA. At these meetings, teachers and schools are held responsible for learning problems beyond their control. Thus according to "experts", if a child encounters learning problems because his/her mother took drugs during pregnancy, or if a sixth grade student performs at a third grade level in reading but is assigned standard sixth grade work – or for any of the myriad reason beyond *direct* influence of the school – the finger of guilt is pointed at society and schools. Time-tested assessment methods such as standardized tests or evaluating the child's developmental history are simply ignored. It is difficult to estimate the impact of this shift in responsibility – fostered by the most powerful educational and psychological associations – which impairs the learning process, reduces morale of those who work within schools, and encourages parents to assume they can relegate responsibility for their children's psychological development and academic fate to others.

Academic Misinformation

Affirming that history repeats itself, the academic community continues to support unfounded and environmentally based optimism, reminiscent of the early days of busing. "*The Rising Curve: Long Term Goals in IQ and Related Measures*,"[61] a recent publication of

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the APA[8], was written primarily to discredit *The Bell Curve* which examines the interplay of genetic, neonatal, perinatal and environmental forces in ethnic learning profiles.(65) In support of *The Rising Curve*, an official APA sponsored sales brochure asserts that *The Rising Curve* tells a different story than *The Bell Curve*: "... Intelligence test scores are going up everywhere in the world and the Black-White gap in school achievement of American children has closed substantially in recent years ..."(62) Although various APA* publications assert that *The Rising Curve* rebuts *The Bell Curve* "beyond any doubt", the story is not quite so encouraging: Careful reading of *The Rising Curve* reveals a bias not only in selection of authors but also discloses how data can be manipulated in pursuit not of truth, but of political goals.(63)

Despite absence of data to support the contention that ethnic achievement gaps are indeed narrowing, and consistent with the APA funded attack on *The Bell Curve*, Oxford University published a series of articles on race and IQ.(64) Contributors were influential egalitarians who advanced three primary claims. First, the authors express concern that *The Bell Curve* "argues that ... in part intelligence is genetically determined." This is a strange allegation; few scientists deny that intelligence has genetic components. The second concern focuses on Arthur Jensen's alleged assertion "of fixed innate social difference." However a careful reading of Jensen's writings reveals an appreciation of environmental and genetic interactions in the shaping of intelligence. Third and finally, the authors fault *The Bell Curve* for "tainted sources" of research. This last charge is especially puzzling. Does one judge facts on the basis of funding? In retrospect, what credibility should be awarded Oxford University, the Brookings Institute, the Ford Foundation, Harvard University, and the U.S. Office on Civil Rights, which supported pro-busing studies which are now admitted to border on educational malpractice?

Seemingly oblivious to the failure of busing and the rationale upon which it was predicted, the nation's prestigious centers of

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[8] The significance of an organization such as the APA underwriting an attack book which targets the *The Rising Curve* can hardly be understated.

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learning persist in perpetuating educational myths. A lead article in the AERA's flagship journal, *Educational Researcher*, featured the presidential address of James Banks.[65] Within the context of various race-related topics, Banks opines that researchers' greatest responsibilities are not to seek truth but to conduct studies which "empower marginalized communities." Lost in the rhetoric is accumulating evidence that schooling interventions which ignore scientific evidence are eventually counterproductive. Banks acknowledges that a number of egalitarians assisted in preparing his president's address: not one of his collaborators advocates the application of biophysical research in formulating educational interventions or the role of parents in facilitating a child's adjustment at school and elsewhere. Further, Banks praises the work of Kenneth Clark during the landmark *Brown* ruling, and declares that Clark's work "... epitomizes the socially responsible scholar in a democratic, pluralistic society ..." In this presidential address, Banks levels thinly veiled charges of "racism" against writers who have reported significant differences in group aptitude and achievement test scores of African-Americans and White Americans. Perhaps it is not coincidental that Banks' chief targets are the same as those castigated in the APA publication, *The Rising Tide: The Bell Curve* and specifically target Arthur Jensen, whose competencies have drawn plaudits from researchers working outside the more politicized and less scientific arena of direct educational policymaking.[66]

Popular media sources continue efforts to mask the high price the nation has paid for busing. In a recent lead article, *Time Magazine* acknowledged that busing had not met the stated objectives, but claimed the practice had produced achievement benefits.[67] I requested evidence of those claims, and the editors referred me to the *Harvard Report on School Desegregation* (HRSD), a study headed by Gary Orfield, which, as we have seen, provided no evidence of benefits for the continued busing advocated by Orfield and his Harvard associates. *Time* also praised the research of Kenneth Clark and others, whose predictions of achievement and social-emotional gains accruing from busing are now clearly errant. Nothing is said about Clark's assurance, and the assurance of other "experts" to the High Court, that busing alone would promote racial harmony and result in higher Black achievement levels.

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Comprehending Educational Fiascos: One Case Vignette

Institutions continue to mismanage societal responsibilities through patterns of power and reward which are incomprehensible unless that abuse of power and reward is perceived in the lives of individual social scientists, upon whom the nation relies for policy guidance. Inasmuch as the lives of educational researchers reveal hidden reasons why the public has been denied and is being denied truth concerning educational issues, and with reluctance because the matter revives unpleasant memories, I now summarize some of my personal experiences. I realize that some of what I report is seemingly surrealistic: I invite skeptics to contact me directly if they wish additional documentation. In this brief discussion I avoid describing how intra-university dynamics, reflecting "political correctness," affect a university professor's working conditions in terms of such issues as committee assignments, promotions and resources such as graduate assistantships. I also omit experiences of one Midwestern university professor whose dean and department head alleged mental illness because the professor questioned busing benefits. Instead, the focus here is on broader institutional issues which impact on the lives of individual educators and reduce the capacity of universities, clergy and governmental agencies to appropriately discharge their missions.

My journey into the labyrinth of educational research began early in graduate studies at the University of Chicago; at that time the nation was then, as now, convulsed by schooling policies which impacted on race. Unquestioned in graduate classrooms was a popular theory that made no sense to me: Benjamin Bloom's writings concerning the "Superior Northern Environment." Bloom's thesis, spun from Otto Klineberg who played a key role in the *Brown* decision, assumed that the longer African American children lived in New York, the higher their IQs.[68] Analysis of the Bloom-Klineberg data quickly revealed enormous errors. Data were selectively used: those scores which indicated Black IQs did not increase as a result of living in the North were simply jettisoned. The test employed to measure IQ change had not been sufficiently validated to qualify for inclusion in *Buros Mental Measurement Yearbook*, which contains reviews of even marginally valid tests. Further, astonishing claims were made, such as a 30 point IQ rise after Blacks lived ten years in

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the North.

As a graduate student, I studied longitudinal IQ trends of Chicago African-American students in the schools I taught. After submitting research findings to a prominent psychology journal, I soon received a rejection slip. The rejection note was accompanied by a succinct editorial note advising me that I had no business questioning prestigious scholars with respect to the "essential truths" they expressed. After warning me of the consequences, the editor of another journal printed my paper.[69] It proved to be the first published evidence of a commonly observed fact – living in the "Superior Northern Environment" has not ameliorated educational problems of Blacks. To the credit of the University of Chicago, I suffered no retaliation for authoring the paper. Now, nearly 40 years later, egalitarian claims concerning the "Superior Northern Environment," once a sacred social science tenet, are summarily dismissed.

By the mid-1960s I was employed at a university, and research investigations led me to conclude that events within schools would not discretely and significantly enhance African American learning. Therefore I proposed, and later directed, Home Start which by the late 1960s and into the mid-1970s was one of two national model preschool programs endorsed by the U.S. Department of Education.[70] Home Start had two primary assumptions: (1) given the significance of biophysical factors, all children should receive comprehensive medical care which included genetic counseling where appropriate, and (2) parents are the primary teachers of their own children. When the school district which operated Home Start was pressured to bus, a group of parents asked me to testify. In the highly visible court trial, I provided evidence that busing would be nonhelpful and probably harmful. Shortly thereafter, and without any hearing or explanation, I was terminated as primary consultant of Home Start.

Ronald Reagan's selection to the presidency was partly attributable to broad public support for examining the educational impact of forced busing, which by then the general public recognized as a counterproductive educational "reform." A Reagan appointee persuaded the National Institute of Education (NIE), research division of the U.S. Department of Education, to launch a

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comprehensive study on the impact of busing on Black academic achievement and I was asked to chair the seven person task force. As described later in this paper, my NIE services were prematurely concluded when I reported panel results which revealed the failure of busing to boost African-American academic achievement.[71] As one colleague later remarked to me: "You dig up the facts, but be ready to bury them."

As the Reagan presidency progressed, Federal efforts focused on civil rights of all Americans. Largely because of my research on busing effects, I was asked to serve as Chair of the Iowa Advisory Commission, U.S. Commission on Civil Rights (USCCR). In this capacity, and as demonstrated in my earlier writings, I continued to publicly oppose such measures as affirmative action, busing, and quotas. During this period some of the nation's premier media giants launched attacks against Reagan initiatives and Reagan appointees who favored "color blind" policies designed to provide equal treatment for all Americans. Therefore the *Des Moines Register*, a Gannett subsidiary, assigned reporter Frank Santiago to do an exposé on me. Santiago volunteered that he had researched my background and my research and found no evidence that I am a "racist." Nonetheless he acknowledged that he intended to destroy me professionally. Shortly thereafter the *Register* ran several front page features which attacked me as being unsympathetic to civil rights and having "links" to "racists."[72] Further, the *Register* initially refused to publish my response to their attacks; I learned that as a "public figure" I had no defense against libel: a newspaper can publish outright lies and for this a public figure has no recourse. A power struggle developed within the USCCR, led by Commission members and later USCCR Chairperson Mary Berry who, as Assistant Secretary for the U.S. Department of Health, Education and Welfare had in the 1970's asserted that Blacks perform better academically if bused.[73] At personal risk, Reagan appointees came to my defense: the Staff Director of the U.S. Commission on Civil Rights expressed an "overwhelming sense of indignation at the arrogance and lack of fairness "of the *Register's* "scurillous" articles[74]: ultimately my associates and I were able to publish responses.[75]

During the early 1990's, and despite spectacular media accusations associated with my position on busing and related issues,

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I maintained a working relationship with the Iowa Department of Education (IDE). Partly this was because of favorable legislative reaction to my testimonies in State committees concerning the value of small community schools and, separately, of home schooling. Therefore I received a grant from the IDE to assess the educational merit of various paradigms of mainstreaming, which in Iowa generally fell under the rubric of CBA (Curriculum Based Assessment), a statewide IDE initiative. Busing had triggered the CBA movement: once schools were racially balanced, classrooms were racially unbalanced; few African-American children were assigned to higher ability groups. CBA, a form of mainstreaming or "untracking," was the preferred answer. The CBA rationale assumes that standardized and especially aptitude or IQ tests are of little value, biological factors are essentially irrelevant to academic learning, and what students learn is essentially limited to what transpires in the classrooms. After several discussions with IDE officials, I received a grant to examine whether CBA, with its strong egalitarian bias, is educationally productive. A comprehensive literature review produced no evidence that CBA produces long-term educational benefits.(76) Disappointed with the results, and committed to publishing results of my investigation, the IDE, without my knowledge, commissioned three CBA advocates to write responses which appeared alongside my report.(77) My request to answer their critiques was denied; since then I have not received any research support from IDE.

As egalitarians pressed for nationwide mainstreaming, I submitted an article to the journal *Educational Leadership* which was published.(78) Here I questioned the merit of mainstreaming or placing students in the same instructional groups irrespective of skill levels. To my surprise, my article appeared alongside three articles of mainstreaming advocates who critiqued my research.(79) I requested but was denied an opportunity to respond to the critics. That wasn't all: university officials informed me that the article was of "poor quality." They refused to specify how the article was "poor," but largely because of the "poor" article – and for the first time in 28 years – virtually singled me out for denial of merit pay. I then wrote to the Executive Editor of *Educational Leadership*, who replied that if the article had not been of high quality, it would not

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have been published.[80]

Opposition persists with respect to providing the public an open dialogue on the complexity of human learning and of societal issues. Recently the influential journal *Education Week* featured a positive assessment of busing effects.[81] Readers were told that busing "freed" millions of Black children from an "inferior education". Further, the article included a glowing tribute to Kenneth Clark as having "secured the role of social scientists." I submitted a statement which was accepted for publication. After signing a contract, I awaited publication. Several months later I learned that somewhere along the educational chain of command the following article had proven offensive and would therefore not be published:

YES, WE CAN LEARN FROM BUSING

Your series of articles subsumed under "Lessons of a Century: The Struggle for Integration" (March 24, 1999) correctly notes that issues involving school desegregation, also known as forced busing, continue to spark lively debate. More than 20 years ago I sponsored a series of symposia entitled "Constructive Alternatives to Forced Busing." Presenters consisted of school board members, civic leaders, scholars, and parents who represented all major ethnic groups. Symposia participants were asked to avoid rhetoric and focus on facts in predicting outcomes of desegregation busing, a reform which was then being initiated. Many of those who designed and implemented busing plans refused to participate in the symposia: they preferred to moralize the issue of forced busing and to hurl dirty words at those who sought to employ science in assessing outcomes when students were required to attend schools distant from home.

Quite unlike the media, educrats, and NAACP leaders, who uncritically promoted forced busing, symposia participants did their homework and examined facts which yielded disconcerting predictions. Facts indicated that forced busing would increase truancy rates, a prediction now validated. "White flight" was also predicted, even though educational "experts" assured the nation that student populations would remain stable. But alas: in community after community, parents who had the means to avoid forced busing did so. Forced busing therefore wrought precisely what "experts" assured us would *not* occur: resegregation of poor and minority students. Disagreeing with "experts" who informed courts that minority academic achievement would increase

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if African-Americans attended school with whites, symposia participants predicted no such minority schooling benefits. Today not a single social scientist can produce evidence that busing enhances learning profiles of students who represent any ethnic population.

During the time a Boston symposium was conducted, a *Boston Globe* poll revealed that despite efforts of Boston's NAACP to promote busing, over 80% of African-American parents preferred neighborhood schools. On this issue, little has changed. Jacqueline Johnson, who as a child was one of the first African-American students to be bused, now wants her children to attend a Boston neighborhood school.

Current polls mirror Ms. Johnson's sentiments: few parents of any race want their children forcibly bused. But today, as in the 1970s, there are those who seek to impose a modern brand of slavery over others. Thus Leonard Alkins, president of the Boston NAACP, not only defends ongoing busing but expresses concern about "affirmative action and diversity being attacked on all levels." (*Boston Globe,* March 14, 1999). It would be helpful and indeed enlightening if Mr. Alkins could specify *any* benefits of forced busing.

We do know what forced busing has *not* accomplished; it has not narrowed the achievement gap between black and white students. This should not really be news. In the early 1980s I chaired a task force of the National Institute of Education, research arm of the U.S. Department of Education, which assessed the impact of forced desegregation on minority test profiles. It was not possible to identify a single study which demonstrated that busing enhanced African-American achievement scores. Results of this investigation were presented at the National Press Club in Washington, where bureaucrats expressed concern that such information would discourage forced busing. I replied that if the practice is nonhelpful or possibly even harmful, it should be discontinued. Within a week, funds allocated for publishing unvarnished findings were mysteriously "redirected" and publication plans jettisoned.

Education Week's feature on busing includes commentary by Robert Peebles which illustrates the difficulties in objectifying actual busing effects. Mr. Peebles cites the 1973 report of the U.S. Commission on Civil Rights which "documented several encouraging, even promising findings" (p 47) concerning desegregation or forced busing. However during the 1980s and while I served as Chairman, Iowa Advisory Commission, U.S. Commission on Civil Rights, Commission members generally acknowledged that forced busing was unhelpful and more

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complex answers were needed to improve social justice.

Thoroughgoing and objective inquiry into school reforms designed to improve educational quality for all students, of which forced busing is only one, is long overdue. Since the Great Society programs of President Lyndon Johnson's administration, literally millions of students have been harmed by expensive and nonhelpful reforms. School boards have been fired, principals changed, curricula revamped, and "social promotions" enacted to avoid stigma and then ended because passing students from grade to grade only exacerbated the problems. "New math" has been introduced and then removed, phonics banned and reinstated, and class size reduced. The list of counterproductive reforms goes on. Head Start remains politically popular, despite compelling evidence that it fails to produce long term schooling benefits. Reformers have introduced "fast" and "slow" tracks, being careful to disguise their names, and then eliminated tracking. Remedial programs have proliferated from the elementary grades through college, but have accomplished only a curricular "dumbing down."

One fundamental error underlies unproductive educational reforms, such as forced busing: this belief, elevated into dogma by educrats and special interest groups, is that what students learn is overwhelmingly dependent on what transpires *within* classrooms. But years ago the U.S. Department of Education awarded G.W. Mayeske a series of grants to appraise the central ingredients of effective education. Consistent with the conclusions of James Coleman, as cited in David Hoff's subfeatured article (p 33), Mayeske found that schools alone explain only a small fraction of what students learn. Raw statistics consistently demonstrated that almost all student learning depends on *collaborative* efforts of home, school, and community, as well as genetic considerations. For educrats and special interest groups, this simple finding was and is abhorrent: it threatens self interests.

Beyond investigations of Coleman and Mayeske, persuasive evidence concerning the actual impact of schooling practices has long been available. Back in the 1960's, Arthur Jensen, Professor of Educational Psychology at the University of California at Berkeley, was hard at work trying to improve educational quality and equity. In 1969 he published one of the most cited publications in the history of social science "How Much Can We Boost School Achievement and IQ" in the *Harvard Educational Review*. To the dismay of educrats, Jensen not only exposed the futility of widely heralded schooling reforms, but showed

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many of them to be downright harmful. Nonetheless educrats fondly perpetuate the very practices shown to be without value. Could General Motors or Ford continue to stay in business if they operated free of cost constraints and irrespective of whether their cars operated dependably?

Now, 30 years after publication, some leading educators have acknowledged the merit of Jensen's path-breaking proposals. In 1998 the prestigious educational journal *Phi Delta Kappan* published a feature article captioned "The Sociology of the Gene: Genetics and Education on the Eve of the Biotech Century." The author describes how and why the role of genes to human learning has become mainstream within medical circles, and contrasts this with the educational establishment's "vitriolic attack" on Jensen for demonstrating the importance of home, school, community, and genetic factors to successful educational practices. Of all central components to learning, heredity is the most controversial and yet probably the most salient. Sincere Americans who question the role of genes to viable educational enrichment need only examine studies on identical twins raised in entirely different environments. These investigations, conducted at the University of Minnesota, underscore the relevance of genetic knowledge to a productive understanding of human learning.

Across the country, elected officials such as Boston's Mayor Thomas M. Menino deserve kudos for focusing on what can be done to strengthen neighborhood schools and promote parental assumptions of responsibility for their children's development and learning. Disappointing results of current educational practices, such as forced busing, based solely on simplistic environmental assumptions, will be laid bare if public officials succeed in strengthening neighborhood schools and encouraging reforms based on what students can *realistically* be expected to learn. Given a climate which enhances collaboration of home, school, and community, within the context of scientific findings concerning the genes, teachers can get down to the real business of teaching in line with the uniqueness of each student, irrespective of social class, ethnicity, or other demographics. * * *

Education Week's treatment of forced busing, marked by data distortion excluding open discussion, constitutes a microcosm of obstacles facing objectification of educational realities in rapidly changing America. Quite contrary to *Education Week's* claims of benefits, actual busing consequences reveal how Black children have

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suffered because institutions have infused a false sense of morality and political expediency into decision making. Courts failed to distinguish *de jure* and *de facto* desegregation, media giants and "civil rights officials" ignored vigorous resistance of most Black parents to the enforced destruction of neighborhood schools, churches and synagogues confused justice and counterproductive egalitarianism, and the nation has therefore witnessed a subsequent decline in the quality of life within all, but especially Black, communities. Educational policies have largely ignored individual differences as well as scientific findings regarding environmental-biological interactions of human development, and our most fundamental institutions continue to grant policy powers to egalitarians whose perspectives perpetuate educational myths which offer no demonstrable hope for America's most needy and most deserving students, their families, their neighborhoods, and their communities. Perhaps the most discouraging single index is provided by evidence that social scientists currently are afraid to express their opinions on sensitive but critical important social issues: in working its way through racially sensitive educational issues, the nation has no eyes.

Can We Learn From History?

After tracing the rise and decline of 26 civilizations, the English historian Arnold Toynbee concluded that societal stability depends on institutions responsibly discharging their responsibilities.[82] A retrospective assessment of busing casts profound doubt as to whether contemporary American institutions can be sufficiently freed of bias to formulate viable societal policies. There is no evidence that institutional priorities have changed since 1969, when Senator Daniel Moynihan observed that even modest public awareness of busing failures came about "under the influence of persons and institutions at *best peripheral* to the world of American education."[83]

As educational truths continue to emerge only through those who are "peripheral to the world of education," children and families suffer. Can realistic societal and educational reforms be implemented? It depends on how one reads the words of Soren Kierkegaard: "Life can only be understood backwards. But it must be lived forwards."

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2. Over the past four decades, large numbers of African-American parents opposed busing. As one illustration in 1976 a group of Black parents asked me to testify against the break up of Boston's Black neighborhoods. Concurrently, a *Boston Globe* poll revealed that 83% of Black parents opposed forced busing, as the NAACP insisted. See also Stephen, W. G. and Feagan, J. K. (Eds) *School Desegregation: Past Present and Future*, especially pages 18 and 137 for data concerning Black opposition to busing.
3. Estimate by the U.S. Office of Education, reported in Supplemental Brief for the United States on Reargument October Term 1953, *Brown v Board of Education, 347 U.S. 483 (1954.* Fifteen years later one group of experts projected busing costs at between $100 and $160 billion for the next ten years. Later, Gordon and Jablonsky (Gordon, Edmund W. and Jablonsky, A.) "Compensatory education in the equalization of educational opportunity." *Journal of Negro Education*, 1969, *37*, 280-290) upped the figure to $101 billion per year. In late 1999, a *Wall Street Journal* editorial estimate costs of busing in Kansas City alone at $2 billion through 1999.
4. Coles, R. *The desegregation of Southern schools: A psychiatric study.* New York: Anti Defamation League of B'nai B'rith, 1963. Further, Charles Silberman noted that when Black children often seem to give up trying at all, "when expected to perform at levels equivalent to White children." Separately Supreme Court Justice Lewis Powell declared ". . . busing defeats the goal of racial balancing, adversely affects education, and contributes to urban deterioration." (remarks, September 16, 1970, when U.S. Supreme Court was considering the Charlotte-Mecklenburg, NC desegregation case. Also, Hartcollis, A. "City wide reading and math scores fall sharply." *New York Times*, June 9, 1999. Frommalino, R. "U.S. Project fails to close education gaps between rich and poor, studies show."
5. In Chicago, approximately 10% of African-American female high school students are pregnant each year. the high post-busing illegitimacy rate of young African-American females is also documented in *Federal Street*, a Public Television documentary, Boston, 1984. Further, see *Statistical Abstracts of the United States*, U.S. Department of Commerce, 1999 which cites the proportion of registered illegitimate births of Black mothers at 69.1%. Contrastingly, 1960 illegitimacy ratios by color per 1,000 live births was 22 for Whites, 202 for non-Whites. *Trends in Illegitimacy, United States, 1940-1965*, U.S. Department of Health, Education and Welfare, Washington, D.C., February 1968.
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1997, the percent of children living with single parents rose from 4.7% to 18.2%; in 1972 73% of children lived with their two original parents and by 1997 the figure was 51% (Annual General Social Survey, National Opinion Research Center, University of Chicago, *Waterloo Courier*, November 24, 1999.

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compared to one in 244 Whites. Associated Press Report. *Waterloo Courier*, June 8, 2000. Further, ethnic differences in life style disproportionately handicap African-American children in ways schools cannot fully compensate. Thus in Iowa Blacks have a child abuse rate nearly four times higher than Whites, and a juvenile incarceration rate more than 25 times greater than Whites, as cited in an Associated Press report, *Waterloo Courier*, April 2, 2000.

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BOOK REVIEW

The Genetical Theory of Natural Selection
A Complete Variorum Edition
Ronald Aylmer Fisher
(Edited by Henry Bennett)
Oxford University Press, 1999
318pp; $45.00

One of the more influential monographs in the history of evolutionary biology is available in a newly revised edition four decades after its last printing. Earlier this year Oxford University Press published *the* definitive version of Sir Ronald Fisher's *The Genetical Theory of Natural Selection*. As 'a complete variorum edition', the text of this monumental classic in population genetics incorporates changes and corrections from Fisher's amended personal copy of the first edition. It also contains a new forward by Henry Bennett, Professor of Genetics at the University of Adelaide, South Australia, and editor of Fisher's collected papers. In three appendices, Bennett lists the changes in the 1958 edition, includes a selection of editorial notes from exchanges in correspondence between Fisher and distinguished scholars that highlight points of agreement and dissent over particular points in the text, and presents an annotated list of related papers published by Fisher.

Originally published in 1930, Fisher's landmark monograph put forth a major theoretical interpretation of how natural selection via heredity affects variation. In the new forward, Bennett describes Fisher's book in the historical context of early 20th century scholarship on Darwinian evolutionary studies.

> The genetical theory of natural selection is celebrated as the first major work to provide a synthesis of Darwinian selection and Mendelian genetics. Its publication in 1930 marked a turning point in the development of evolutionary thought, contributing fundamentally to the renaissance of Darwinism following a long period of neglect. It is a work remarkable for what it reveals of Fisher's creative genius and his insight into many of the problems facing evolutionary biologists today.

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Bennett recounts a fascinating revelation that Joan Fisher Box (Fisher's daughter) describes in her 1978 biography *R. A. Fisher: The Life of a Scientist*. Fisher dictated the original manuscript to his wife over a nine-month period, between October 1928 and June 1929 and, except for two mathematical sections in different chapters, the text appeared as initially dictated with little if any changes to the hand-written draft of the original manuscript. Bennett reminds the reader of Fisher's genius most of this dictation exemplifies the level of Fisher's ability to formulate such a detailed quantitative analysis from memory. Most of the text was composed during evenings given Fisher's daytime supervisory work in the Statistics Department at Rothamsted Experimental Station.

Fisher sent the completed text, chapter by chapter, to his good friend Leonard Darwin, the son of Charles Darwin and, like Fisher, an enthusiastic proponent of eugenics. Bennett, who edited a collection of Fisher and Darwin's correspondence from this period in an earlier monograph, notes that Fisher dedicated the book to Major Leonard Darwin. This dedication is "in gratitude for the encouragement, given to the author, during the last fifteen years, by discussing many of the problems dealt with in this book".

The variorum edition reprints the complete text of the first edition, published by Oxford University's Clarendon Press in 1930. One third of the 1500 copies printed were sold within the first year of its publication and sales of the book tapered off until the last copies were sold in 1947. In the mid-1950s, Dover publications approached Fisher about reprinting his book and in fact published what Dover promoted as an 'unabridged, second revised edition'. As Bennett explains, the 1958 Dover edition contains some corrections that Fisher recorded over the years in his own copy of the original edition. Portions of the original text were omitted in this revision, namely two detailed sections from different chapters, and the second edition failed to include several paragraphs that Fisher submitted for Dover's 'revised' version. In notations to the original text, this variorum edition clarifies the changes that appear in the Dover version and corrects several typographical errors and mistakes from the 1958 text; editorial changes are listed as endnotes in the 2nd appendix.

The late evolutionary biologist W. D. Hamilton, a leading

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theoretical founder of sociobiology, notes that as a student he considered Fisher's book to "weigh in equal importance to the entire rest of my undergraduate Cambridge BA course... Fisher's logic and ideas still underpin most of the ever broadening paths by which Darwinism continues its invasion of human thought". Michael Ruse, Professor of Philosophy and Zoology at the University of Guelph in Ontario, reflects upon the significance of Fisher's book, "This work, *The Genetical Theory of Natural Selection*, is generally considered Britain's greatest contribution to evolutionary thought since Darwin". Shortly after Fisher's death in 1962, J. A. Fraser Roberts described the impact of Fisher's scientific contributions in the journal *Biometrics*.

> If during recent years scientists had been asked to compile a short list of, say, five or six names of those whose labours during this century have completely altered the face of science it is a fair guess that his name would appear in almost every list.

The first few chapters lay out the core of Fisher's views regarding natural selection, the role of particulate inheritance, Mendelian genetics, variation and the nature of genetic mutations. Fisher emphasized the role of *selection* in Darwinian evolutionary theory and showed how continuous variation could be explained by Mendelian inheritance. He further argued that when properly interpreted, well-established biometrical methods of analysis illuminate Mendelian principles of population variability. Fisher's analysis formed the basis of what he identified in Chapter two as the 'fundamental theorem of natural selection' *'The rate of increase in fitness of any organism at any time is equal to its genetic variance in fitness at that time'*. Fisher expanded his views on the theory of dominance, random mutations, genetic variance, and gene frequency distributions among natural populations.

The remaining chapters of Fisher's book are devoted to the application of these scientific principles in the study of man. Here Fisher's concerns pivot around the dysgenic trends of the 'differential birthrate'. According to Fisher, the forces of natural inheritance the full range of mental, moral and physical qualities affirmed by heredity largely establish the "permanent conditions" of an advanced

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civilization. Such conditions are maintained at sustainable levels when society's more successful, and hence adaptable, members replicate their numbers with each generation. Fisher noticed a dysgenic trend between the professional classes and the ranks of the disadvantaged; those in the latter category, who generally are unable to maintain a stable existence, *average* more children per household than those in the former category. A self-imposed condition of celibacy, which leads to sterility and infertility among the more successful members of society, augments the destruction of advanced civilizations. Fisher summarizes the consequences of this differential fertility trend in chapter ten.

> Since the birth-rate is the predominate factor in human survival in society, success in the struggle for existence is, in societies with an inverted birth-rate, the inverse of success in human endeavor. The type of man selected, as the ancestor of future generations, is he whose probability is least of winning admiration, or rewards, for useful services to the society to which he belongs.

Fisher argued that a redistribution of the birthrate would stabilize the deleterious effects of poverty and reduce the dependency for subsidized redistribution schemes, which transfer wealth (via taxation) from the affluent to the poor. Accordingly, the conceivable benefits to society from capital invested to assist in the proliferation of "men of average ability somewhat above that of the general population" and the "dividends" earned from this form of capital investment, Fisher articulated a sensible position that considered the posterity of future generations.

While revising the text of his book for the second edition in the mid-1950s, Fisher consulted with the late Oxford geneticist Edmund Brisco Ford over specific points in Fisher's notes. Ford replied to the prospects of reprinting Fisher's book by noting,

> I need hardly say how delighted I am that one of the most outstanding text books of biology is to be reprinted. It has been an amazement to me that the original edition did not sell out long before the War but, after all, a book is to be judged not by its sale but by its effect upon science, and no book of this century has had

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a greater effect upon biology than has this one, the ideas spreading out from it trough, apparently, a limited number of readers of the original, but that kind of thing is what both you and I are accustomed to find (people like to be given little summaries).

Thanks to the prodigious efforts of Professor Bennett, this complete variorum edition of *The Genetical Theory of Natural Selection* will provide a new generation of researchers with an updated landmark volume in the history of evolutionary biology.

Kevin Lamb

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Conscientious Evolution

Herbert F. Mataré

Conscientious Evolution is an unabridged reprint of the author's first edition – a 314 page book by a distinguished scientist with outstanding qualifications in electronics and solid state physics. He stresses the need for humanity to come to terms with the reality of the universe and the importance of heredity in shaping human abilities and qualities. It is written by a scholar with profound concern for the future of civilization and posterity. He expresses his fears about the current unprecedented explosion of the world population and the disastrous dysgenic effect of modern western attitudes to sex and casual procreation. His goal is the survival of a genetically-sound human population in an ecologically sound and supportive environment. This outstanding and inspiring text includes chapters on the following topics:

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